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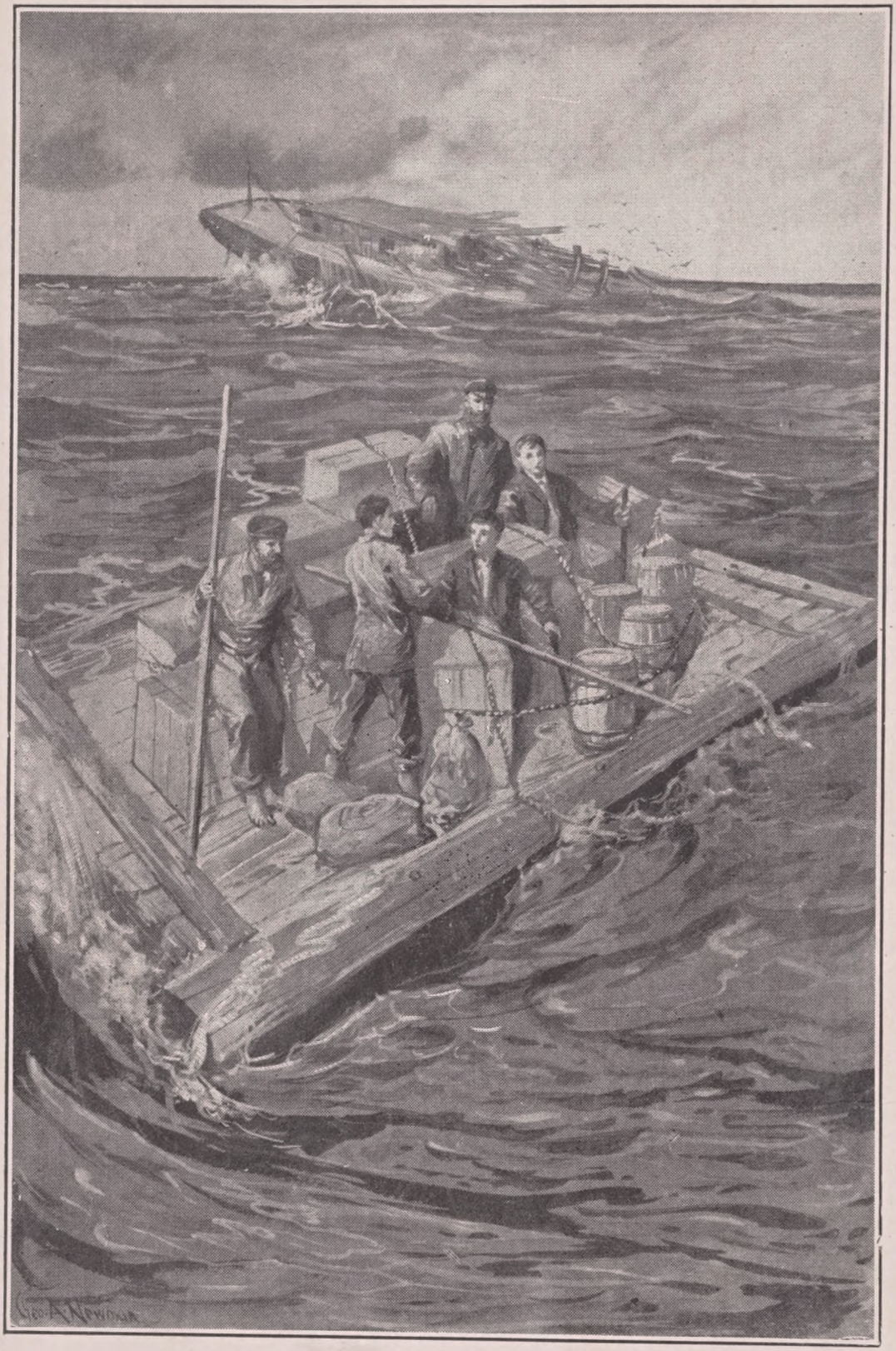

"Pushing the raft off into the channel, it was soon caught by a tidal current and carried slowly toward the island."
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Wrecked on a Coral Island

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CHARACTERS

Captain William M. Parker, commander of the Ketrel.

Lieutenant Arthur Harding, first mate of the Ketrel.

Harold Arthur Harding, nephew of Lieutenant Harding.

John Parker Jackson, a ward of Captain Parker.

Charles Young Pleasanton, picked up at sea in an open boat.

Hiram Higgenbotham, boatswain of the Ketrel.

John Maddox, an early inhabitant of the island.

Rompey, a collie dog.

Satan, a poll-parrot.

Wrecked on a Coral Island

CHAPTER I

The Wreck of the Derelict Brig

"Breakers on the starboard bow!" cried the lookout.

The speaker was one of a crew of three boys and two men, all of whom were on deck. Their vessel, a brig, had evidently experienced stormy weather. Neither of its masts was standing, having been broken off close to the deck.

But besides its missing masts, the brig had the appearance of having weathered more than a single severe storm. Not only had its rudder and rudder-post been swept away, but one familiar with vessels could see the remains of a jury rudder that had been carried away by heavy seas.

Everything about the brig showed that she lacked the repairs that are always given to a vessel intended to be kept in continued use. The paint on the woodwork had long ago disappeared, and the woodwork itself showed signs of decay. The outer sides near the water-line were not only covered with barnacles, but had taken on the greenish tint that, in the sea, is generally one of the surest signs of age. Indeed, an experienced observer would probably have suspected, as was the case, that for a long time the brig had been

a derelict, and was only being temporarily employed by its small crew; for they had no means either for steering or propelling the vessel, and were being carried not where they wished to go, but wherever the winds and the waves chose to take them.

But one accustomed to the sea could have detected more than the old and dilapidated condition of the brig. He could also have seen undoubted evidences of its threatened breaking up at almost any moment.

Deep anxiety could be seen in the faces of the small crew, especially in those of the two men. That all recognized the danger of the brig going to pieces at any moment, was evident by the life-preservers they had fastened around their bodies. Indeed, even a collie dog, that was standing near the two younger boys, had been similarly provided; only, instead of a single preserver, two preservers had been employed, one fastened immediately back of the fore legs, and the other in front of the hind legs. Evidently the owners of the dog were mindful of its safety.

For fully six days the brig had battled against an almost continuous storm. During this time it had been so severely beaten by the waves that those on board were surprised it had not fallen to pieces long before. They knew it could not hold together much longer and, as best they might, had prepared for the end. During the prevalence of the storm, the heavens had been so continuously overcast that it had been impossible to determine their exact locality by an observation of the sun or other heavenly body. Con-

sequently, they did not know in just what part of the ocean they were.

When the lookout reported "Breakers on the starboard bow!" they all looked anxiously in the direction indicated. They could just detect a short line of breakers near them, while farther beyond was a much longer line. In both, the water was being hurled furiously against the land with a loud, booming sound. Indeed, the keen sight of the lookout had been greatly aided by the evidence of his ears; for, he heard the roar of the breakers before he could dimly discern them.

Curiously enough, almost immediately after the lookout had reported the threatening dangers, the sky began to lighten on their bow, and the sun, momentarily breaking through a rift in the clouds, distinctly disclosed the two lines of breakers. The nearer line was off a small reef lying directly across the path in which the brig was drifting. The more distant one stretched across their path for several miles to the right, and the left along the shores of an island. But as they were unable to steer the brig, they could only wait for what appeared to be certain destruction. If thrown on the nearer reef they would be wrecked. If they escaped this, they must necessarily be dashed against the much longer line of the reef of the island.

The little crew of five was a crew comprised of our old friends whose adventures have been recited in "Five Months on a Derelict." Hiram Higgenbotham was lookout and had reported the breakers to Capt.

Arthur Harding, first lieutenant of the Ketrel, and subsequently captain of the derelict brig. The other members of the crew were three boys, John Parker Jackson, a ward of Capt. William M. Parker, commander of the Ketrel; Harold Arthur Harding, a nephew of Captain Harding, and Charles Young Pleasanton. Jack, the oldest of the three boys, was not quite seventeen, while the two other boys were much younger, being nearly fourteen.

It may be well, for the sake of those who have not read "Five Months on a Derelict," briefly to recite the prior history of the crew of the derelict brig; to tell just how they happened to be on the brig, as well as to describe briefly some of their adventures.

The full-rigged ship, Ketrel, had left Liverpool for Yokohama, Japan, under the command of Captain Parker. After a pleasant voyage to the South Atlantic it had stopped to discharge a part of its cargo at Cape Town, near the southern extremity of Africa; for, it had taken the southern route from the Atlantic to the Indian Ocean in preference to the shorter, though in some respects less advantageous, route through the Suez Canal and the Red Sea.

Leaving Cape Town, the Ketrel sailed nearly due east. When off the southeastern coast of Australia, an open rowboat, containing neither oar-locks nor oars, was picked up adrift. Its only passenger was a collie dog. This animal exhibiting a marked preference for Harold was given to the lad, who thus became its master. This dog, whose name "Rompey" was found

engraved on its collar, possessed unusual intelligence even for a collie, a species of dogs that, as is well known, are especially marked for their intelligence.

When the Ketrel reached the China Sea it was completely wrecked by a great storm, the dreaded typhoon or cyclone. All the crew were safely transferred to the ship's boats. One of these boats, commanded by Lieutenant Harding, contained besides two of the crew, Hiram Higgenbotham, the boatswain of the Ketrel, and two boys, John Parker Jackson and Harold Arthur Harding. Captain Parker, who was the last to leave the Ketrel, was only a short distance from the ship when she foundered. The boats kept together, steering for the coast of China, Captain Parker's boat leading, and Lieutenant Harding's following. During the first night the boat commanded by Lieutenant Harding was separated from the other boats and, after unsuccessfully endeavoring to find them, had proceeded alone toward the coast.

The storm, or, more correctly, a succession of storms, continued for five days, and gave those in Lieutenant Harding's boat much severe work to keep afloat. During the storm the two sailors were swept overboard. On the fifth day after the sinking of the Ketrel their boat was run into and destroyed near midnight by a derelict brig. They succeeded not only in boarding the brig, but also in transferring to it the provisions and water supply they had in their boat. Bearing in mind the severe weather through which they had passed, it was natural that they feared

all the other boats had been swamped and their crews drowned; but in a letter found in a floating bottle, picked up at sea long afterward, many thousands of miles from where the Ketrel was sunk, they read the glad news that all the other boats, with their entire crews, had been picked up by a steamer bound for Tokio.

They found the brig, though water-logged, quite comfortable. Its cargo consisted mainly of supplies for the towns that had been springing up in the neighborhood of the mines recently discovered in Southern Africa. The greater part of this cargo consisted of lumber and millwork for portable houses. Since all this lumber had been subjected to a chemical treatment, it had not become water-logged. The cabin and middle hold, therefore, were above the water-line, and since a large part of the cargo consisted of different kinds of groceries, canned goods, and air-tight packages of rice, corn, and oatmeal, beans, peas, etc., there was more food on board than they could eat during several years. Then too, the wrought iron water-tanks still contained an abundance of fresh water, and they had managed to keep them filled by the frequent and heavy rains that fell on the brig.

In addition to the above there was a plentiful cargo of small hardware, household goods, and kitchen utensils. They had, therefore, been able to spend an agreeable time on the brig, during which they had been carried by the winds and ocean currents to many parts of the Pacific. During this voyage, which up to the

time referred to in the beginning of this story had covered a period of five months, they had experienced many exciting, though generally speaking, pleasant adventures.

Among one of the most exciting of these adventures was when they had been carried by a storm nearly into the heart of the great Sargasso Sea of the North Pacific. They finally escaped from this danger by being towed out of that almost windless and stormless sea by a huge cachelot, or sperm-whale, they were fortunate enough to harpoon.

During one of many storms the brig had safely weathered they were nearly run down by a huge steamer that was shortly afterward wrecked. This information was obtained from the boy, Charles Young Pleasanton, who was afterward picked up in an unconscious condition in one of the open boats of the steamer, containing the decomposing bodies of four men.

Curiously enough, this boy was the former master of Rompey, who instantly recognized him. Charley and Harold became warmly attached to each other, and agreed that the dog should belong to them equally.

We come back now to the crew of five on the derelict brig, at the moment the lookout had reported breakers ahead. The momentary lightening of the sky that almost immediately followed the sighting of the breakers continued. The clouds were blown away, and in a short time the full sunlight of a tropical day illumined all the ocean around them. They could now

see, a mile beyond the breakers, the dazzling white sand beach of a coral island, against which a line of breakers was dashing, while a short distance back of it were the green plumes of the tops of cocoanut palms.

But what commanded their instant attention was the line of breakers furiously dashing against the nearer reef that was entirely disconnected from the distant sand beach. This reef, which we will call the breaker reef, in order to distinguish it from the island reef, was not continuous. Here and there were channels through which the water was furiously rushing in the general direction of the distant island.

The brig was being rapidly carried by the waves toward the breaker reef. They had no means of navigating her, not even a rudder, and were therefore obliged to wait for the inevitable striking of the vessel. Nor did they have to wait long. Caught by the tidal current, the brig was being carried through one of the openings in the submerged reef. They had already begun to lower one of the brig's boats, the one in which Charley and his dead companions had been found. Seeing that the boat if lowered would reach the breakers, the captain gave up the effort, and beckoning to his companions to follow him, ran toward the opposite side of the brig, and mounting on the rail, stopping a moment to shout:

" Keep together in the channel, and swim away from the reef," dove into the water.

None of them hesitated to follow him, not even Rompey. They heard the crash of the brig against the

reef as they reached the water. With the exception of Hiram, they were all good swimmers. The boys, indeed, were unusually good swimmers, and were almost as much at home in the water as a duck is in a pond.

They kept as near together as possible. At first they had no little difficulty in preventing the waves from dashing them against the reef, but soon, caught by the strong tidal-current that was settling toward the distant island, they were rapidly carried along with it.

"Take it easy," said the captain. "The tide is rising and is setting toward the island. We have a swim ahead of us of at least a mile before we can reach land." Then turning to Harold and Jack, he remarked: "I know you two can cover that distance easily. How is it with you, Charley?" he added, turning to the other lad.

"I have often gone much farther, sir, in the ocean off Australia. I can easily reach the island."

"Charley," inquired Harold, "I suppose Rompey will have no trouble in swimming that mile?"

"Don't worry about that," said Charley, laughing, "Rompey can swim it better than any of us."

The only one of the party who had any difficulty was Hiram, who, like most sailors, knew more about moving over the water in a boat or ship than of swimming through it. However, aiding him from time to time, they at last found a piece of the wrecked brig, and placing him on it, continued to swim with it toward the distant island.

Satan, a poll-parrot they had found on the brig and made a pet of, had, of course, accompanied them. She was far more at home in the ocean of air than any of her companions were in the ocean of water, and so flew through the air toward the island, although always keeping near them. She was greatly excited and continued to scream out the various phrases she had learned, even adding, to their great surprise, a number of far from choice additional phrases they had never before heard her utter, which she had apparently learned long before her introduction into polite society.

As they steadily drew near the island, the water suddenly shoaled near the shore, and they soon stood on a beach of fine white coral sand.

Looking back to the wrecked brig they could see the breakers dashing furiously against the breaker reef, and enveloping it in a cloud of mist, while along the beach of the island, both to the right and left as far as the eye could reach, they saw a continuous sand beach lined almost continuously by breakers. The sea was breaking over one part of the beach, and at times poured water on the land that did not return to the ocean.

"Where are we, Captain Harding?" inquired Jack.

"On a coral island," was the reply.

"Have you any idea in what part of the ocean?" continued Jack.

"I cannot tell you its exact latitude and longitude," answered the captain. "We have been unable to make an observation of the sun or other heavenly body for

the past five days. The island, however, cannot be far from some point of the Pacific midway between the coast of South America on the east and the coast of Australia on the west."

"And what is our latitude?" continued Jack. "I know that we are somewhere south of the Equator."

"We must be somewhere between 15° and 18° south," replied the captain.

"Well, cap'n," said Hiram, "ez there's a-plenty fer us to do, what shell we do fust?"

"The most important thing," replied the captain, "is to endeavor to recover as much of the wreckage of the brig as possible. Nearly all that floats should at last reach the island. Unfortunately, much of our foodstuffs will sink in the waters near the reefs over which the breakers are dashing. Still some of these goods may reach the island, especially, such as are packed in wooden boxes, barrels, or hogsheads. Do you remember just how the brig broke up, Hiram?" he continued, addressing the boatswain.

"I kain't tell fer sartin, cap'n," was the reply. "It all happened so etarnally suddent that I ain't able to say jest what did take place. I think, howsumever, that ez the brig was thrown agin the reef she broke into two pieces. The half toward the bow was pretty well smashed, but the other half, that near the starn, held together, and was landed in fairly shallow water."

"Uncle Arthur," exclaimed Harold, "Hiram is right. The brig broke into two pieces. The part toward the bow was smashed, but the other part, nearly

half, was wedged in between rocks where the water was not very deep, for I remember seeing the brig more than half out of water."

"Yes, captain," said Jack, "that's just what I saw."

"And I too," exclaimed Charley.

"So I'm the only one," remarked the captain, smiling, "who failed to look back toward the brig."

"That, sir," remarked Jack, "was because you were so busy thinking about our safety that you only looked forward and not backward."

"I guess you're right, Jack," was the reply. "If we can build a raft so as to reach the wreck, we may be able to recover much of our canned goods and groceries, as well as some of the household stuffs, for, as you remember, most of these goods were stored in the vessel near the stern. Here too was the cabin containing the library, the manuscript of the doctor's work on the "Physical Geography of the Sea," and most of the scientific instruments."

"Cap'n," said Hiram, "kin we do enything now?"

"No, Hiram," was the reply, "even if we had a raft or boat it would be dangerous to visit the reef at high tide. The tide is still running up, and judging from the appearance of things on the beach, will probably continue to run up for an hour longer. The tide will, therefore, not be low again for many hours."

"Then what can we do, captain?" inquired Jack.

"I think the first thing will be to dry our clothes. So let's cross the island toward the lagoon, where we will probably find a good place for this purpose."

CHAPTER II

The First Day on the Island

Harold and Jack, who had never seen a coral island, wondered what the captain meant when he spoke about crossing the island to the lagoon; for, both were nearly sure he had never seen that island before. They were puzzled, therefore, to understand how he could speak so confidently about crossing the island until they reached the lagoon, whatever that was. Seeing that the captain was busy thinking how best to meet their new difficulties, they refrained from asking questions, and followed him as he climbed the slope of the beach toward its top.

It was not much of a hill; probably not more than five or six feet in height, but it was fairly steep. The beach consisted of coral pebbles and coral sand, a few worn shells, and occasionally the bones of fish, or the bleached shells of crabs. Reaching the top they saw a piece of wooded land rising gradually to a height that nowhere exceeded twelve or fifteen feet above the level of the sea.

This part of the island was covered with a shallow layer of soil, consisting mainly of white coral sand slightly darkened here and there by small quantities of soil derived from the gradual decay of plants and animals. The highest land in this part of the island

was situated about one-sixth of a mile from the ocean. It was evident that its layer of soil was shallow since, in some places, huge fragments of coral rock projected above the surface. Although of coral-limestone, yet these blocks had been so blackened by exposure to the air, or by the dark-colored lichens that they were of an almost black color. They were of various sizes, some being quite large. Where fragments had been broken from them during recent storms, the fractured portions showed the same brilliant white color as the coral sand on the beach. Continuing to press onward for one-sixth of a mile, in the same direction; *i. e.,* opposite to that of the ocean, they at last came to the edge of another beach, also of dazzling white sand, that sloped downward by a gentler inclination than the beach facing the ocean, to a beautiful lake some fourteen miles in length and twelve miles in width.

"Here's the lagoon," said the captain, as they stood at the top of its beach looking over this large body of water.

It was a beautiful sight. Near the shores the waters were of a wonderful yellowish-green, while farther away they were of a blue that reminded them of the waters of the deep ocean, save that the tone of the blue was somewhat lighter.

Walking down the sloping beach to the edge of the lagoon, they could see that the bottom here was covered with a layer of fine sand, although at other places, as they afterward discovered, the bottom was either muddy or was covered with growing corals.

When the captain exclaimed, "Here's the lagoon," Harold, speaking in a low tone to Jack, said:

"So lagoon means lake, Jack, does it not?"

"It seems so, Harold," was the reply.

"Have you never seen a coral island before, Harold?" said Charley, who overheard the conversation.

"No, Charley, neither has Jack. Have you?"

"Yes," was the reply; "moreover, I have read about them. A regular coral island always has the shape of a narrow ring of land encircling a clear spot in the ocean called a lagoon. There are beaches both on the outside facing the ocean, and on the inside facing the lagoon."

This was certainly the structure of the island on which they had been cast, for an irregular ring-shaped mass of land, as far as they could see, completely surrounded the lagoon. Everywhere, except on the northeast, the island was low, and for the greater part, from one-third to one-half a mile in width; that is, counting the width as the distance across the ring from the ocean to the lagoon. On the northeast, however, it was both higher and broader. There was an abundance of bright green vegetation, the greater part of which appeared to consist of cocoanut palm trees.

The island was so extremely odd in appearance that it greatly interested both the boys, especially Jack, who, turning to the captain, said:

"Won't you tell us something about coral islands, captain?"

"All in good time, Jack," was the reply. "Just now

we must get off our wet clothes and dry them. They'll soon dry if we place them on the beach, and while this is going on, I think a bath in the lagoon will be refreshing; for, as you know, none of us have had our clothes off since the beginning of the storm about a week ago. But before doing this, come with me along the shore of the lagoon, I want to show you something."

They followed the captain as he walked along the sandy beach at the edge of the lagoon until they came to a place where, growing in the shallow water on the bottom, a number of curious-looking objects could be seen closely resembling huge china asters, or, perhaps, more closely, big chrysanthemums. They were furnished with colored appendages, or arms, that looked like the petals of these flowers, and, moreover, like them, were of different gorgeous colors.

"Be careful, boys," said the captain, "while in swimming, not to touch any of these animals."

"Do they bite, captain?" inquired Jack.

"No, but they can give painful stings," was the reply.

"Are they animals, Uncle Arthur?" exclaimed Harold in surprise. "They look more like flowers than animals."

"They do, indeed, resemble flowers, but they are animals for all that. They are called zoophytes, Harold," was the reply. "As you will probably remember, zoophytes are animals that closely resemble plants."

"Oh, I remember now," said Harold. "Zoophytes are plant-animals. But they don't look like the zoophytes we saw on the seaweed or wrack near the Aleutian Islands." Harold was referring to a delicate, white, lacelike coating that covered the surfaces of the kelp or seaweed they had been observing, in the North Pacific, while on the derelict brig.

"There are many kinds of zoophytes," said the captain. "Those you are now looking at are of the kind that furnish the material from which coral islands are formed. I'll tell you about them some other time. But let us now go back to the place where the lagoon has a sandy bottom, where there are no zoophytes in sight. We will take off our clothes, spread them out on the beach to dry, and while waiting will have a pleasant bath. Don't go out far from the shore. If there is any direct communication with the ocean there will probably be sharks in the lagoon."

It did not take the boys long to remove their wet clothes and spread them out on the hot sand of the beach. A swim is something a live, healthy boy is always glad to take, and the clear waters of the lagoon were very attractive. Moreover, their wet clothes, heated on the outside by the tropical sun, and on the inside by their bodies, were beginning to steam, and were, therefore, extremely unpleasant. Besides, their cork life-preservers they had not yet removed, acted not unlike overcoats, and overcoats in the tropics, near midday, are far from comfortable.

The boys were so eager for a swim that they had

their clothes off, spread them out on the sand to dry, and were in the water fully five minutes before either of the men.

The fine coral sand was soft to the feet. The waters though quite warm, were so much cooler than the body that they enjoyed their swim to the limit, and were soon having great times ducking one another, and playing the pranks so common to boys when swimming in water at a pleasant temperature. Indeed, they enjoyed the swim so thoroughly that the captain had some difficulty in persuading them to leave the water, every now and then, to turn their clothes, so that the sun might dry them more rapidly, and when this was done for the last time, it required some additional persuading to get them out of the water to dress.

They had time carefully to look around them while dressing. There were four islands in the lagoon, all of which appeared to be formed after the same plan as the island on which they had been cast. All were of a circular or oval outline and, like the larger island, encircled lagoons or bodies of water.

"How does the water get in here from the ocean, Uncle Arthur?" exclaimed Harold. "I noticed while swimming that the water is of about the same saltness as the ocean."

"Look there, Harold," exclaimed the captain, turning to a part of the beach on the right, at a distance of about half a mile.

Harold saw, in the direction indicated, a place where the land was somewhat lower than the rest of the

island. Here, every now and then, a high wave from the ocean broke over the island and ran down into the waters of the lagoon.

"I wonder where we can get drinking water?" exclaimed Jack. "I am thirsty with the swim and the walk."

"Possibly," said Charley in a laughing tone, "you are also thirsty because you haven't had a drink for the last five or six hours."

"I guess you're right, Charley," replied Jack, laughing. "However, I'm thirsty all right. Are springs generally found on coral islands, captain, where one can get fresh water?"

"Yes, Jack," was the reply; "there is generally no difficulty in getting plenty of good drinking water on a coral island, sometimes from springs, though generally by digging wells. As a rule, there is hardly any part of a coral island where good drinking water will not quickly collect in wells dug from five to ten feet below the surface. We may, however, find a spring near the part covered with trees. Suppose we look for one over here where the trees come near to the top of the beach of the lagoon."

After a search of about fifteen minutes they found a spring from which a plentiful supply of excellent cold water was found running down the beach into the lagoon. Having satisfied their thirst, as well as that of Rompey, they continued their way across the island toward the ocean.

When they started to cross the island toward the

lagoon, Satan, unwilling to be left behind, perched on Jack's shoulder, calling out occasionally:

"I'm hungry! Give me something to eat!"

No one took notice of the bird, but after the swim, and while on their way to the ocean, Harold, listening to what the bird said, remarked:

"So am I, Satan," and then turning to Hiram, he remarked: "I suppose we ought to find something to eat on this island, ought we not?"

"There be a-plenty," remarked Hiram. "It'll be odd if we don't find good eating in the cocoanuts on them trees," he continued, pointing to a clump of cocoanut palms. "Do ye think ye can shin up thet tree," he continued, pointing to one of the tallest of the trees. "Ye'll find the nuts only at the top in the clump of leaves there."

"I shouldn't wonder if I could," remarked Harold, walking toward the tree that Hiram had pointed out.

"And so can I," exclaimed Charley.

The lads were good at climbing and soon reached the top of the tree, when they began throwing a number of cocoanuts down, and then quickly came down themselves.

Each of the party now had a good-sized cocoanut, but the question was how to get at anything good that might be inside of it, for the nuts were not very attractive looking as they came from the tree.

"I hev eaten cocoanuts afore," said Hiram. "Let me pint out to ye how to begin," and taking a knife from his pocket he opened the blade and showed them

how to remove the thick covering of husk. The nut, so uncovered, had near one end three dark spots something like eyes, one of which was larger than the others. " Ye can cut a hole easy here," said Hiram, pointing to the largest eye.

Then cutting a hole at this place he handed the nut to Harold, saying:

" Try a drink o' cocoanut milk, my lad."

To look at the lad's face the sample was evidently quite satisfactory; for he expressed in pantomime his approval of the liquid by grinning and rubbing his stomach with his free hand. The nut was partially filled with a thin milklike liquid of a somewhat sweetish taste equal, as Harold stopped drinking for a moment to declare, to the best drink he had ever taken.

Either by the aid of Hiram's knife or their own penknives, all five were soon busily engaged in drinking the liquid nourishment they were taking from the cocoanuts. When each had emptied the nut, Hiram remarked:

" Now, ye are through the fust course, let's pass on to the next," and showing them how they could most easily break open the nuts, they did so and found them filled with a delicious white, sweet, and almost solid meat, nearly an inch thick.

But it had a far different taste from the comparatively dry, hard, and tough meat found inside the cocoanuts that reach such distant places as London, New York, or Philadelphia. Instead of being hard and tough, it was more like a partially hardened cream

or sweet butter. Indeed, it was so luscious that none of them stopped eating until the entire contents had been devoured. The noisy requests of Satan for a share of the feast, and the quieter though no less earnest waggings of Rompey's tail, resulted in Charley opening an additional nut which was shared between the bird and dog in proportion to their relative sizes.

Seeing that the boys were tired and sleepy, for none of them had had much sleep during the past two or three nights and days, and knowing that the tide would not be low until near six o'clock, the captain suggested they should all take a sleep. So leaving one of their number awake to watch, it being understood that the watch should be relieved at times agreed on, the others were soon in a sound, refreshing slumber. After several hours sleep they continued their walk toward the ocean, which they reached at the same place where they had landed.

So curious a change had taken place during their absence that at first sight neither Jack nor Harold could believe it was the place at which they had landed. Instead of finding a fairly steep sand beach extending down to the ocean, there had been added to the land a wide piece of smooth, nearly flat rock, several hundred feet in width, beyond which the waves were breaking. This additional land sloped gently down to the ocean.

When Hiram saw the look of surprise in the faces of both Harold and Jack, he exclaimed:

"What be it thet surprises ye, my lads?"

"The place looks so different," said Jack. "The island seems to have gained so much ground since we left it not many hours ago."

"Yes," said Harold; "when we left the water was here," pointing to the edge of the coral beach, "and now," he said, "it looks as if all this land had been added to it."

"In truth," said Jack laughing, "during the few hours we have been away and sleeping, a change has occurred greater than that poor Rip Van Winkle experienced in the little village of Sleepy Hollow, when he returned from his sleep of a hundred years in the Kaaterskill Mountains. This, you remember, was after taking a glass of schnapps given to him by the little fellows when he had carried liquor up the mountains."

"I say, Jack," said Charley laughing, "perhaps we have been sleeping longer than the few hours you believe. Possibly it was not merely cocoanut milk we drank, but a wonderful drink prepared by some wicked magician who hocused it for us."

"Oh, shut up, Charley," cried Jack laughing, "none of your joking. Tell us, captain," he said, turning to that gentleman, "what has made the wonderful change in the appearance of the place."

"Don't you remember, Jack," said the captain, "while swimming in from the breaker reef how shallow we found the water within several hundred feet of the island? A large portion of the outer side of a coral island, that is, the side turned toward the

ocean, consists of a gradual sloping area of hard coral rock called the shore platform. This part is almost completely covered by the ocean during high tide, and almost uncovered at low tide. What has happened is simple. It is now low tide and the shore platform has nearly run dry of the water that covered it at high tide. This has made the great increase in the area of the island."

CHAPTER III

The Flotsam From the Wrecked Brig

It was now about five o'clock in the afternoon. All were greatly refreshed by their few hours of sleep. Considerable wreckage brought by the tide from the brig was spread over different parts of the flat surface of the shore platform. By far the greater part of this material consisted of pieces of cork, boards, or such kinds of millwork as wooden doors, window-frames, door-frames, and various other parts of portable wood houses. Besides these, a number of boxes and barrels were either lying on the different parts of the shore platform or on the sandy beach.

"There is much to be done," said the captain to his companions. "Suppose we first move the boxes and barrels to the top of the beach, where they'll be out of the way of the next high tide."

The contents of barrels filled with flour had been ruined by the water. The contents of two puncheons marked port wine was in good condition, the puncheons being of course watertight. There was a number of boxes whose contents, on opening, were found to be in satisfactory condition. These were filled with ten-pound packages of oatmeal, cornmeal, rice, and dried fruit, such as apples and peaches. Several barrels they had found when first on the brig about one-

third filled with crystallized sugar, the remainder having been dissolved by the water and which they emptied out, dried, and then carefully headed. While floating from the brig to the shore probably one-fourth of the sugar they had contained was not yet dissolved. So, pouring off the water that had leaked in, they placed them where they would dry on exposure to the hot air.

Besides the floating packages, they found several chairs and tables from the household goods, and a number of wooden bedsteads. There were also several bundles of highly colored blankets like those from which they had made overcoats while in the cooler regions of the Kurile Islands. The dye stuffs of the blankets were fairly fast so that, although thoroughly soaked, the colors had not run to any great extent. There was also a number of mattresses, soaked in sea-water, but not otherwise injured.

"These will be of use," said the captain, referring to the blankets and mattresses. "A few days' exposure to the sun will thoroughly dry them."

None of the boxes or barrels that contained canned goods or other heavy articles was found. These of course had sunk when thrown into the water on the partial breaking-up of the brig.

"Unless the part of the brig you all say you remember having seen resting on the rocks is still standing, we can hardly hope to recover much of our heavier groceries."

"Wall, captain," replied Hiram, "thet half of the brig is still standing all right; for thar she is," point-

ing to the distant breaker reefs, " standing up above the water. She looks as if thar wuz much good stuff still in her."

Looking toward the distant reef, they could now distinctly see a portion of the brig. This was not only because they were standing on the shore platform near the ocean, but especially because the cloud of spray raised by the breakers that had cut off a view of the brig shortly after they had left it, had now disappeared, and its remains were visible.

The captain did not immediately answer Hiram. He was evidently engaged in deep thought. At last he spoke to his companions as follows:

" We must find some way to reach the remains of the brig early to-morrow morning. There are still several hours before sunset. Let us at once begin making a rude raft so as to have it ready by to-morrow's low tide. We ought to be able to build some form of raft for this purpose, should we not, Hiram? " he said, turning to the boatswain.

" Sartinly, cap'n. With all this stuff floating by," he said, pointing to many large pieces of the timbers from the sides of the broken half of the brig, " we kin build a raft easy. Then, ef we manage to git off when the tide is running down, I reckon we kin reach the wreck of the brig. Of course, it'll not be safe to git thar much afore the water is slack, sence them breakers are wery dangerous, as we hev reason to know."

" Then let's begin," said the captain.

" Fust of all," said Hiram, " we must find a landing-

place; fer, although the breakers ain't wery strong now, arter a while, when thet tide rises, a raft would be of no use, ez we couldn't land her."

"Then," said the captain, "we must at once begin looking for some kind of harbor where we can build the raft."

But the finding of a harbor was by no means easy. Harbors were few and far between. They had carefully examined the coast for six miles to the west before they found a fairly good harbor, which they agreed to call Jackson Harbor, after Jack.

Most of the heavy pieces of wreckage from the brig had been carried by the waves to the edge of the shore platform, and were floating in the deeper waters of the ocean near its outer edge. After considerable trouble they got these together at Jackson Harbor, and placing them side by side, held them in place by other lighter timbers laid over them—pieces crosswise and also side by side. Fortunately, among the wreckage was some cordage, some of it of considerable length.

"I wish I hed a barrel of nails and a hammer," growled Hiram. "One don't know how waleable tools be ontil he hasn't 'em. Howsumever, we must do the best we kin with this 'ere rope."

It was long after dark when they stopped working, not because the work was finished but for want of light.

"We will get up early to-morrow morning," said the captain, "so as to complete the work in time to take advantage of the tide that will then be

setting out from the island. Of course, we'll time our leaving so as to reach the brig at slack water. I hope we can safely board the brig and load our raft with any goods that may not be spoiled by the water, and leave for our return to the island before the breakers become too dangerous.

"Cap'n," said Hiram, "ez we have no means fer tying the raft to the shore, hedn't we better pass the night on her so as to be thar to keep her from starting off ef the tides during the night should begin to carry her away from the island?"

"Your suggestion is excellent, Hiram," said the captain. "We'll spend the night on the raft. I guess we can manage to be tolerably comfortable. Certainly we shall be more so than if we should attempt to sleep on the damp shore platform. Of course, we'll divide our party into watches, so as to see that the raft does not start out to sea shortly after the beginning of the ebb tide."

There were two watches, the first consisting of Captain Harding and Jack, and the second of Hiram, Harold, and Charley. Nothing of importance occurred during the night except that during Hiram's watch they were obliged to call the captain and Jack to help keep the raft from being carried out to sea shortly after the beginning of the ebb tide.

Long before there was light enough to see distinctly they were up preparing breakfast, after which they put the finishing touches on the raft. Then waiting until such time during the ebb tide as they judged

would bring them to the brig by slack water, they succeeded in pushing the raft off from the shore platform and were moved slowly by the tide toward the brig.

Fortunately, there was a fairly strong wind blowing directly from the island toward the brig. Aided in this way they reached the breaker reef at about the time of slack water.

If they had been surprised at the great change in the width of the island between the ocean and the sand beach, when they returned to it from their swim in the lagoon, they had greater reason for being surprised when they reached the site of the breaker reef. Instead of dashing waves and threatening currents, all they saw was a strip of coral reef with several breaks through which the water was slowly running out from the island; so slowly, indeed, that the currents could hardly be observed. The reef had then been left high and dry. Moreover, there was a fairly extended area of flat rocks corresponding probably to the shore platform of the coral reef that was also out of the water. Indeed, had not a channel existed along the side of that part of the reef on which the remains of the brig had been thrown, it would have been impossible to bring their raft within fifty or sixty feet of her.

The platform, or rock surrounding the reef on the side toward the island, was covered with various heavy articles that had been thrown from the brig, and had sunk to the bottom before they reached the deeper water outside. But what especially pleased them was

to see that the remains of the brig was resting high and dry on the highest part of the breaker reef, and that, strange to say, it did not appear to have been very badly broken by the shock that thoroughly wrecked the half nearest the bow.

"The first thing to do," said the captain to Hiram, "is to board what remains of the brig. It looks as if there ought to be large quantities of valuable materials that are still uninjured."

"Cap'n," exclaimed Hiram, "while ye are doing this, I'll see ef I kin find some spikes and a sledge hammer to put the raft in better shape."

On boarding the remains of the brig they were greatly relieved to find that comparatively little water had entered it. The cabin was still fairly dry, but had been badly broken by several timbers that had been forced into her during the going-to-pieces of the other half of the brig. Unfortunately, these timbers had hopelessly ruined the chronometer and sextant, as well as most of the scientific instruments. The round table, at which they had passed so many pleasant hours in reading and talking, had been smashed into pieces that were lying on the floor, and the papers and other articles that had been left in the drawer were scattered over the floor of the cabin.

While these losses were greatly regretted by the captain, there was a part of the contents of the cabin that had not been injured. The valuable library was almost intact, except that some of the books had been wet by the spray of the breakers. But there was

something the captain was looking for apparently with considerable anxiety. Jack, who made a fair guess at what this was without saying anything, commenced to look on the floor and examine the articles that were scattered over it in all directions. Finally picking up a package of papers, he turned to the captain and said:

"Captain, isn't this what you are looking for?" handing him the manuscript of the doctor's book on the "Physical Geography of the Sea." "It must have fallen out of the drawer of the round table when it was broken by the timbers that were thrown against it when the brig was broken in two."

"I am very glad this manuscript has not been injured, Jack," replied the captain, carefully examining the bundle of manuscript which, to his great joy, was found to be in fairly good condition; "for, as you know, when we get back to civilization I hope to have it published, and shall see that any royalties received from it are paid to the doctor's heirs."

When the captain spoke about what he hoped to do when they got back to civilization, Jack said to him:

"Do you think we will ever get back to civilization, captain? Are the chances good for our doing this?"

"It is hard to say, Jack," replied the captain. "We must wait and hope."

There was silence for a few moments. Both speakers realized that their chance of being taken off the island by a passing vessel depended both on the character of the island as well as on its situation, and on

neither of these questions had they then any information.

As soon as the captain was convinced that no serious damage had befallen the manuscript, he turned to his companions and said:

"Now, we'll see whether any of the cargo stored in this part of the vessel has escaped damage from the water. From the condition of things in the cabin, I think we will find many of the groceries and other articles in fairly good condition."

While the captain and Jack had been examining the manuscript of the doctor's book, Hiram, who had gone with Harold and Charley to look for spikes and hammers, came into the cabin with the cheering news that the goods in the middle hold of the brig appeared to be but little injured by the wreck.

Hiram had brought with him a tool-box, several large hammers, and a quantity of large iron spikes and nails. Speaking to the captain, he said:

"The fust thing I'd like to do would be to put our raft in condition so it kin hold together better."

An hour's hard work was spent at Hiram's suggestion in spiking together the upper and lower timbers.

When this work was completed, the captain, turning to his companions, said:

"Of course we must get away from the reef before the coming high tide brings the breakers with it. We have now only a few hours left and must, therefore, hurry."

In view of the short time left for transferring the

goods from the brig to the raft, a less intelligent man than the captain might have at once begun this work, but the captain knew that because they had so little time they could not afford to hurry thoughtlessly. In other words, though he would not fail to hurry, yet he appreciated the necessity for hurrying intelligently. In this respect he was not unlike the surgeon who, while performing a major operation, had inadvertently cut a large artery. His assistant, losing his nerve by the flow of blood, endeavored in a hurried, unintelligent way to check it.

"Stop," cried the surgeon, "we have no time to hurry"; though, nevertheless, while talking, he took every precaution that nothing that was being done should require to be done twice.

And so it was with the captain. Instead of at once setting them all to work carrying the goods from the hold to the deck of the brig, and then from the brig to the raft, he proceeded, with the assistance of Hiram and his companions, to rig up a block and tackle, so that the goods could be raised from the hold to the deck and then lowered to the raft. Although this took fully three-quarters of an hour, both to find the necessary materials and to rig them in place, yet, when done, by dividing their number into three groups—*i. e.*, two in the hold, two on deck, and one on the raft, they were able readily to do in a single hour what would otherwise have taken many hours.

By means of the advantages thus gained, they were able to place such an assortment of goods on the raft,

that it was sunk in the water almost above the lower line of its timbers.

Quite naturally, while unloading the brig they paid especial attention to her condition. It was evident that the timbers of the half that remained standing on the reef had been so severely wrenched by the blow against the reef that she was liable to fall to pieces at almost any moment. Jack, who had noticed the anxiety in the captain's face, said:

"Captain, how many more trips do you think we can make to the shore and back before she goes to pieces?"

"I cannot say, Jack," said the captain anxiously, "that is what has been bothering me. You remember the brig has been threatening to go to pieces long before she was wrecked on the reef. She has of course been still more weakened by the severe shock that broke her in two. Indeed, I am greatly surprised that she has not completely broken up long ago. In her present condition she may go to pieces at any moment, but I hope she will hold together until the next storm, or the next unusually high tide. However, as far as I can see, we have done all that is possible to do. If she goes to pieces before to-morrow we can congratulate ourselves on the valuable supplies we now have on the raft."

It may be interesting to note the character of their first raftload of goods. It consisted of great quantities of groceries, canned goods, and food products of all kinds, placed in watertight packages. Besides these,

there were various articles of hardware, such as pots, kettles, pans, table cutlery, and cooking stoves; then too, there was an assortment of household goods and chinaware, etc. All these would be of great value if obliged to make any prolonged stay on the island. Indeed, when to the above we add that there was an assortment of such household furniture as bedsteads, chairs, tables, mattresses, blankets, as well as a collection of kitchenware with numerous watertight packages of matches, I cannot blame my readers if they charge me with telling an improbable story. But it must not be forgotten, as has already been mentioned, and as has been more fully recited in " Five Months on a Derelict," that the cargo of the derelict brig, besides being formed largely of cork and millwork lumber, consisted of large quantities of such articles as would be required by the people of the mining towns.

When this is remembered the wonder ceases, for the articles needed at the mining towns were the very things required by our shipwrecked friends, who were about to establish their house on a coral island instead of in Southern Africa.

Besides the above-named goods, there were special articles placed on the raft both by the captain and by Hiram. The captain saw that all the books and charts, together with not only the uninjured scientific apparatus but even the parts that remained of those that had been ruined, were included. He was delighted that the pair of powerful field-glasses they had found when first coming on the brig, as well as a pair he had

brought with him from the Ketrel when they had left her in the open boat, were uninjured. Knowing too, as he did, the excellent fishing-grounds that are generally found both on the shore platform, as well as in the lagoon, he saw that a good assortment of fishing-lines, hooks, etc., was secured. He also was careful to take all the guns, revolvers, and powder he could find.

Hiram, who was skilled as a ship's carpenter and as a cabinet-maker, was careful to take with him all the ship's carpenter's and cabinet-maker's tools he had found on the brig, as well as an assortment of nails, brads, and screws, and small hardware generally. He also secured, as well as he could rapidly, not only a good supply of strong twine suitable for the manufacture of nets, but also an assortment of ropes and cables.

CHAPTER IV

The Final Breaking-up of the Brig. A Valuable Discovery

But the tide was now rising rapidly, and the breakers were beginning to pour so angrily over the reef that it would have been dangerous to remain longer, so pushing the raft off into the channel it was soon caught by a tidal current and carried slowly toward the island.

The tide was still rising when they reached Jackson Harbor and securely moored the raft by the cables to several iron bars driven into the cracks in the limestone. Fortunately, the opening through the shore platform did not pass directly from the ocean toward the beach, but turning abruptly toward the east formed a harbor that completely shielded it from the breakers. The harbor was therefore safe even during severe storms, when it would have been impossible to land on any other portion of this part of the coast. Moreover, there was a sufficient depth of water to render the harbor accessible even at the lowest tide.

Although the head of the harbor where they moored the raft was much nearer the beach than any other parts of the island yet examined, there was nevertheless a strip of the shore platform, about fifty feet in width, that had to be passed before the dry land of the beach was reached.

The captain, therefore, had to devise means for safely unloading. The raft had been so heavily laden that if an attempt were made to push it over the shallow waters of the shore platform it might easily be grounded. And even if they succeeded in taking it to the edge of the sand beach they would certainly be unable to unload before the place was left dry by the receding tide. In either case, therefore, being caught on the shore platform, they would be obliged to wait for the next flood tide, and this would occasion too great a loss of time.

Consequently, there was nothing to do but to wait until the low tide permitted them to carry or roll all their goods to the top of the sand beach. Although this required three hours of hard work, yet they had the satisfaction, as each load was safely left on the top of the beach above the reach of the waves at high tide, of thinking how much comfort they could get from the goods they had thus rescued from the wreck.

They had been working so continuously since leaving in the early morning, that there had been but little opportunity to obtain any food other than that which they had brought from the brig. Therefore, although it was quite late when they had completed their work, they gladly helped Hiram set up one of the cook-stoves, and starting a fire, made a cup of hot chocolate and heated several cans of soup. This done, they enjoyed a comfortable night's sleep on shore on mattresses placed on the bedsteads brought from the brig. Although the only canopy over their heads was the

brilliant arch of heaven, lighted as it was with innumerable stars, yet they slept soundly. The raft being now securely attached by cables to the shore platform could safely be left. Not knowing the character of the island on which they were, they divided their company into watches, who took turns in remaining awake while the others slept.

Since it would be impossible to leave the island next morning until about eight o'clock, there was plenty of time not only to prepare a good breakfast, but also to cook food for use on their second trip on the raft.

The captain was unusually quiet during breakfast. Seeing that he was planning something for the general good, they avoided leading him into conversation. At last, turning to Hiram, he said:

"Hiram, we ought to be able to make our brains save the hard work our bodies were obliged to do yesterday, as well as the time lost in waiting for the change in the tide. It was hard work taking the goods across the shore platform. I have a plan to avoid this work," he continued.

"Wall," said Hiram, "let's hear yer plan, cap'n."

"Yes, Uncle Arthur," cried Harold, "tell us how we can save both the work and the waiting."

"Especially the work," added Charley laughing.

"Easily enough," replied the captain good-naturedly. And then turning to Hiram and pointing to a large quantity of flooring boards that had been washed up by the waves, and piled in a heap at the top of the sand beach, he added: "Why can't we build a

raft with these boards and leave it at Jackson Harbor, so that when the shore platform is still covered with water we can load some of the goods on it and so carry them by water from the raft to the sand beach. Besides this, we shall need a small raft in order to pass between the harbor and the shore during high tide when the light raft has been moored alongside the heavy raft."

"Thet's a great idee, cap'n," replied Hiram, "and sence I hev brought tools and a lot of nails, there'll be no trouble in building a raft big enough to carry to the beach in three or four trips all the goods we bring on the other raft. Ef we work smart, we kin unload the raft on its next trip, and take the smaller raft back to the larger raft afore the tide runs down."

The boys were enthusiastic when they heard the captain's simple plan. They, therefore, constructed a smaller raft and moored it by a cable to the edge of the shore platform at Jackson Harbor near the large raft in plenty of time to reach the breaker reef with the larger raft, about the time of slack water.

As far as they could see, the condition of things at breaker reef had not changed from what they had been on the occasion of their former visit. The remains of the brig was still resting on the rocks, and the space around the reef as before was bare and covered with the heavier articles that had been thrown from the brig when the other half had been broken by striking against the reef. They had not thought it worth their while to place these goods on the raft as long as so

many goods in better condition remained in the vessel's hold.

"We'll not take the time now," said the captain, "to remove them. This can be done some other time. Even if the brig breaks to pieces, it will be possible to collect the heavier of these articles afterward."

There was, however, one of these articles that Hiram was especially anxious to secure. This was the small bronze cannon he had taken from the derelict pirate vessel they had boarded while in the Sargasso Sea of the North Pacific. The captain's permission being obtained, Jack assisted Hiram in placing the cannon on the raft.

When this was done Hiram stood for a moment looking at the cannon with a pleased look, and remarked to Jack:

"One kain't never tell what use we may put this thing to some time or other."

"Against people or animals, Hiram?" inquired Jack.

"I kain't say," was the reply. "But at any rate, it's best to hev it; fer generally, when ye need sich a thing, ye're apt to need it wery partikler."

"That's so," said Jack laughing.

"Jack," said Hiram, "I know we brung a lot of powder with us yesterday, but ef ye see any more don't forgit to have it loaded on the raft."

Using the block and tackle, they again loaded the raft with a great variety of the goods still remaining on the brig, including, especially, the canned goods and small

articles of hardware. At the request of the captain, Hiram selected the materials for several portable houses, nor did they forget to take several boxes containing the panes of glass for use in the window-sash. They continued working on the brig until the rising tide again brought with it the breakers, when they were obliged to cast off from the reef and permit the tide to carry the raft back again to the island.

On reaching Jackson Harbor they found their lighter raft to work admirably, and were able readily to make five successive trips between the larger raft and the sand beach and return it to the side of the larger raft for use the next morning before the shore platform had been left dry by the receding tide.

They made additional voyages to the brig on several successive days, and in this way were able to transfer to the beach a large portion of its valuable cargo. It was hard work, but the brig contained so much material that would be of value to them while on the island they did not mind it.

On their return from the fifth voyage, seeing the younger boys were tired from the continuous hard work, the captain suggested that Rompey and they should take a walk along the beach to rest themselves.

"Don't go more than a mile or so," said the captain; "we don't yet know whether the island is inhabited or not, so there's no telling what you might meet."

"Big bad men might run away with little boys," said Jack laughing.

"They might; might they?" said Charley laughing.

"Come, Harold, let's punish this big bad boy," and rushing at Jack they soon had him on his back in the sand pummeling him good-naturedly.

"You'll call us little boys, will you?" said Charley. "Come now, take it back."

"All right," said Jack laughing. "You great big little boys, please let me up."

"I guess we'll let him up this time, Harold," said Charley.

"Oh, yes," remarked Harold, "but only this time. Look out for the next time, Jack. According to my arithmetic, two little boys may be better than one big boy."

"I guess we can trust you alone," said the captain, who had been an amused observer of the above-mentioned incident.

The young boys started off on their walk accompanied by Rompey, who ran joyfully ahead, greatly pleased that his young masters had at last ceased, if only for a time, from hard work. At last, the dog got so far ahead as to be almost out of sight. When they had at last gone so far from the others as to be unable any longer to see them, they heard Rompey loudly barking.

"I wonder what Rompey sees?" inquired Harold.

"I don't know," replied Charley. "Let's hurry up and find out. From the way he is barking, I guess it's something he thinks worth looking at."

"Yes," replied Harold; "and what is more, it is something that pleases instead of angers him. Don't

you notice it is a glad, pleased bark, and not an angry one?"

"That's so," said Charley.

Running up the beach the boys saw what had so excited the dog. It was the wreck of Boat No. 23, the boat in which Rompey had been picked up in a nearly famished condition.

Rompey had recognized the boat and had taken this method of calling his masters' attention to it.

"It is in bad condition," said Harold to his companion, "but I guess Hiram can make it good and safe now he has his tool-chest with him."

"I'm sure he can," said Charley, examining the boat.

But Rompey had apparently seen something else; for he again began barking, ran a short distance farther up the beach, and turning, gave the boys clearly to understand that he wished them to follow him.

"Let's see what else he has found," said Charley.

As soon as Rompey saw that his masters were following him he ran with a joyous bark a short distance ahead and, running up to something that was lying in the sand, he placed one of his paws on it, and shaking his tail looked up into their faces as if to say:

"Here is something else I have found. Don't you think I'm a clever dog?"

Rompey was thus calling attention to what was one of the oars of the boat and two of the oar-locks, while lying near them were the three remaining oars, all uninjured.

"Do you remember, Harold," inquired Charley,

" whether the other two oar-locks were in the boat? "

" Yes," said Harold, " I remember seeing both of them there."

" Let's take the oars and the oar-locks to the boat," said Charley, " and go tell the captain and Hiram what we have found."

Their companions were greatly pleased at the good news Charley and Harold brought them.

" I reckon we'd better go and look her over, cap'n," said Hiram. " Onless she's in a wery bad condition, I reckon we kin fix her up fer use."

" I hope so," said the captain, " for without a boat on the island we would be at a great disadvantage."

Hiram gave the following opinion after examining the boat:

" She bean't hurt much. I kin sartinly put her in good condition, and thet without wery much work."

" About how long do you think it will take, Hiram? " inquired the captain.

" Wall, ef all of ye help," replied Hiram, " I think I kin do it in about one day's full work."

" Then," said the captain, " we'll give to this work the first day we are unable to make a trip with the raft to the brig."

" Cap'n," said Hiram, who had been examining the sky, " do ye see them clouds in the west? "

" Yes, Hiram," was the reply. " They look ugly, don't they? "

" They suttenly do," replied Hiram. " Ef I'm not greatly mistaken, thar's a-plenty of wind back o' them.

Ef the storm comes which I think is comin', wot is left of the brig'll probably go to pieces to-night."

"I hope not," said the captain. "There is still much in her hold I would like to get on the island."

"But even if she goes to pieces to-night, captain," said Jack, "we have so much safe on top of the sand beach, we can hardly complain."

"That's right, Jack," said the captain. "We have, indeed, recovered a much greater quantity of material than we could reasonably have expected to do. However, we will know better in the morning."

Fearing the coming storm might injure their goods, they erected a rude shelter over them, sufficient to protect them from a heavy rain. That night, after supper, a severe storm broke on the island, and although it was too dark to see what was happening, they could hear the roaring of the breakers at breaker reef.

"I guess the poor brig will go this time, Hiram," said the captain.

"I reckon ye're right, sir," was the reply.

After seeing that their rafts were securely moored by cables to the edge of the shore platform, they sought the cover of their rude shelter and turned in for the night.

Early next day all anxiously looked toward the distant reef. The breakers were dashing furiously over it. Although they carefully scanned it with the field-glasses they had brought from the wreck, yet they could see nothing of the brig. It had evidently been swept away by the breakers.

There was nothing to do now but to wait until the storm subsided. This it did not do until the end of that day. Since, however, the rain was falling heavily, they made no attempt to repair the boat, but were, nevertheless, careful to drag her up beyond the top of the beach, lest she should be further damaged by the unusually strong waves from the ocean that were dashing furiously over the shore platform up the sand beach.

"Captain," said Jack, "I suppose as soon as the storm has passed you will take the raft to breaker reef and bring back whatever of the heavy goods we may find resting on the rocks that are left uncovered at low tide?"

"Yes, Jack," was the reply, "we will make one and possibly two trips for this purpose, for there will certainly be a great quantity of goods found resting on the bare surface of the reef."

CHAPTER V

Repairing the Boat

The next morning broke with such a bright tropical sun and cloudless sky that it seemed almost impossible that only yesterday there had been so severe a storm. Turning a pair of glasses toward the breaker reef the captain looked anxiously to see whether any of the brig yet remained above the water, but there was nothing in sight. Had anything been there he would certainly have seen it, for there was now but little spray.

About two o'clock in the afternoon, pushing the heavy sea-raft out from Jackson Harbor, they started for the reef. Though no signs of the half of the brig were to be seen, yet there was plenty of evidence that it had gone to pieces; for they repeatedly passed portions of her timbers floating in the water between the island and the reef.

Hiram looked on these timbers with longing eyes. Anything in the shape of wood possessed great attractions for him. He therefore suggested to the captain the advisability of securing some of the timbers to the raft.

"There be so many uses, cap'n, to which we kin put 'em," he said.

"No, Hiram," was the reply. "I think we shall find much more valuable stuff on the reef. Besides,

practically all of these timbers will eventually be washed on our island. Although they may be carried by successive tides a number of times between the island and the reef, yet most of them will in the end find a resting-place on our shores."

They saw still greater evidences of the breaking of the brig when they reached the breaker reef. The bare surface of rock was almost covered with heavy articles that had been thrown into the water when the brig went to pieces. Indeed, there was enough of these articles here not only to load down the raft, but even to load it again on their visit the following day.

There was one article lodged on the reef that caused no little surprise. As already related in " Five Months on a Derelict," they had found some coal when they first boarded the brig in the China Sea. This was so small in quantity that they had used all of it by the time they had been blown into the Sargasso Sea of the North Pacific, where they obtained a quantity of driftwood that served admirably as fuel for their cooking stove. Although Hiram had made, as he then believed, an exhaustive search of the hold, no more coal had been discovered. Now, however, they saw scattered over the surface of the reef some four or five tons of coal that had been stored in some inaccessible part of the brig.

" We must get that stuff on the raft," said Hiram. " It'll be wery convenient for our cooking stove."

" What a queer place for a coal mine," said Charley laughing.

"It don't make any difference, Charley," said Jack, "it's coal all right, so we'll take it and be thankful."

Of course, when the brig finally broke up, some of the packages containing foodstuffs that had not been removed from the brig were broken up and their contents scattered not only in the deeper waters but also over the surface of the reef platform. In the deep waters a multitude of fish, including many large sharks, were fighting for the food, while on the bare shore platform great flocks of birds were eagerly devouring the contents of the broken packages.

Pointing to the sharks, Hiram said:

"Ye see, my lads, it's onsafe to do much swimmin' in these here waters. Them fellers could take any of us in at a single gobble."

"It's fortunate they did not do so while we were swimming from the reef to the island," remarked Harold.

"You're right, my lad," said Hiram, "and yet thar warn't ez much danger ez you may hev supposed, fer, ginerally speaking, sharks be wery cowardly, and don't mostly attack a crowd of men. Nevertheless, I reckon we'd better never give them a chance, fer ef they were specially hungry they might eat us."

The captain appeared to be especially astonished at the indifference the birds on the reef manifested to their presence. Turning to his companions, he said:

"These birds do not appear to have yet learned what dangerous animals men are. They act as if this were an uninhabited island."

"And that means, captain, does it not," said Jack, "that our island has not been much visited by ships?"

"I'm afraid you're right, Jack," was the reply. "But we will try to find out. One of the first things we must do when there is no chance of saving anything more from the brig, will be to make a thorough examination of the island."

As already remarked, they were obliged to return to the breaker reef on the next day in order to secure the remaining articles. Another day was spent in gathering together the wreckage that had been thrown on the island. This consisted principally of the cargo of cork, millwork, shingles, etc., that had occupied the lower hold of the brig.

On the evening of the day when all this work had been finished, while they were sitting together after supper, Harold asked the captain:

"What shall we do next?"

"The next thing will be to make a thorough exploration of our island," was the reply. "Though we have now been on it for a week we know almost nothing about it. Of course, we must build a house for shelter, as well as a place in which to store our goods. Now, it would be foolish to start building until we know what part of the island will be most suitable for the purpose. I think, therefore, that the next thing to do, Hiram," he said, turning toward the boatswain, "would be to repair the boat so as to be able to circumnavigate the island."

"Circumnavigate the island, Uncle Arthur!" ex-

claimed Harold in a laughing tone. "I thought circumnavigation meant to sail around. We'll row around the island, won't we?"

"Yes," said Charley laughing, "we'll certainly row around the island, won't we?"

"Now, boys," said the captain good-naturedly, "don't be so sure you're right. Unless I am mistaken, Hiram will fit a small mast on the boat, so that when the wind is favorable we can sail around the island. You can rig up a mast, Hiram, can't you?" he continued.

"I've been calculating to do that wery thing," replied Hiram. "It's true we ain't got no better stuff to make the sails of than the wariegated blankets, like them we used fer our overcoats, but they'll do fer a cat-rig."

"Then we'll circum-row-navigate the island," said Charley, whispering to Harold.

"We'll spend to-morrow in helping Hiram prepare the boat and rig up some kind of mast and sail," said the captain.

"Captain," asked Jack, "do you think we'll be gone much longer than a day?"

"Yes, Jack," was the reply. "We wish to do this work thoroughly. Besides, it is more than likely that, when the breakers will permit, we'll land on different parts of the coast and examine the interior of the island, although I intend afterward to walk completely around the land of the island, both on the seacoast as well as on the shores of the lagoon. We'll there-

fore take plenty of food, as well as such other things as we may need during our absence."

"O Uncle Arthur," exclaimed Harold, "won't you let us take Rompey with us?"

Rompey, who was almost invariably where Charley and Harold were, acted as if he understood what the lad was saying; for he looked earnestly at the captain, began wagging his tail, and uttering a succession of low, peculiar barks, as if he was trying to say:

"Please let me go, I'll be a good dog and not give you any trouble."

As we have already pointed out in "Five Months on a Derelict" many years ago nearly everybody believed that animals are entirely devoid of reasoning powers; that all they do is the result of what is called instinct. Now, however, nearly all who have carefully observed the actions of animals are convinced that while there is no doubt that much of what they do is the result of instinct, yet many of their actions are as much the result of reasoning as in the case of human beings. They had frequently discussed this question, and had come to the conclusion from the many intelligent actions of both Rompey and Satan that they undoubtedly possessed marked reasoning powers.

When, therefore, the captain, in answer to Harold's question, said:

"Certainly, Harold, we'll take Rompey along with us. I am sure he will behave himself and not be in the way," the animal acted as though he understood what was said; for, uttering a number of joyful barks,

he ran to the captain and, resting his paws against him, endeavored to lick his hands and face.

"Look," exclaimed Hiram, "thet thar animal sartinly onderstands what is being said."

"I have no doubt whatever about that," said the captain.

"Understands what's said!" exclaimed Charley. "Of course he does. Don't you, Rompey?" he continued, turning to the dog.

The dog's answer was to run to his young masters, first to Charley and then to Harold, with joyous barkings and shakings of his tail, as if he would say:

"Of course I understand I'm going with you. I don't know where. I believe it is in the boat, but as long as you are going it'll be all right, and we'll have great times."

Hiram, who was never happier than when making or repairing something in wood, had, on the same day the boat had been found by Rompey, laid aside the pieces of wood he had selected for repairing it.

It might be supposed that since the brig was water-logged none of the timber forming a part of her cargo would be suitable for boat-building. As every one knows, water-logged timber is heavier than water and will sink in it, but, as has been explained in "Five Months on a Derelict," all the wood in the brig had been subjected to a chemical process that prevented the entrance of water. This kept the timber in such a condition that it floated in water almost as well as would thoroughly dried and seasoned timber.

There seemed to be a promise of fair weather for some time to come. At any rate, the day they had selected for work on the boat broke bright and clear. They were all so much interested in this work that Hiram, who still insisted on taking the place of cook, and was up bright and early, not only to prepare breakfast but also to cook food for use while on the boat, did not find it necessary to wake his companions. They were up as early as he was.

While they were helping Hiram to repair the boat, which they began immediately after breakfast, the captain, turning to Hiram, said:

"What shall we do for masts, Hiram? There is nothing suitable among the materials we have recovered from the brig. There are several pieces out of which we can cut a gaff and a boom, but nothing long enough for a mast."

"We kin git a mast, cap'n," said Hiram, "by cuttin' down one of the cocoanut trees. The wood is fust-class fer this use. It's straight and tough, and I onderstand the people who live on islands whar there be cocoanut groves use the wood of the tree for oars, clubs, spears, and sich things."

"Then," said the captain to Hiram, "while you and Jack are working at the boat, I'll go with Harold and Charley, cut down one of the slim cocoanut palm trees, dress it into shape for the mast, and bring it here."

"And while ye are at it," said Hiram to the boys, "bring back as many cocoanuts ez ye kin. They'll make good eatin' while on the boat."

Taking with them one of the axes they had brought from the brig, they crossed the island toward the lagoon, accompanied, of course, by Rompey. As they were leaving, Satan, who had been by no means pleased at the work in which her companions had been almost constantly engaged since reaching the island, and seeing that Rompey was going with them, flew near them screaming:

"Another piece here!"

Reaching the central part of the encircling reef, at a point midway between the ocean and the lagoon, they selected a tree, the diameter and height of which were about what they required, and cutting it down, selected the ripest of the nuts with which it was loaded. It did not take long to dress the tree roughly into the dimensions of the mast.

As they were about to return, and were arranging to carry the tree and selected cocoanuts along with them, the captain said:

"Wait a moment, there's something else we'll take back with us," and picking up the axe he cut out the tender green bud at the top of the tree that was almost about to bloom.

"What can we do with that, Uncle Arthur?" exclaimed Harold.

"Why, what should we do with a cabbage but boil and eat it?" replied the captain.

"Why, you don't mean to call that thing a cabbage, do you?" inquired Harold incredulously.

"Wait until Hiram cooks it and then tell me what

you call it," was the reply. "But let's be getting back. There is much work to be done if we are to get off to-morrow in the boat."

The captain picked up one end of the wood for the mast and placed it on his shoulder, the two boys each placing the other end on one of their shoulders, and all taking as many of the cocoanuts as they could stuff inside their coats or jackets, they soon reached the place where Hiram and Jack were at work on the boat.

When Jack looked up and saw the green mass the captain was carrying, he exclaimed:

"What is that, captain?"

"Why, Jack," said Harold, looking toward Charley and winking, "don't you know what that is? I am surprised that a boy so big as to think it takes two boys my size to equal him should be so ignorant as not to know that that is a cabbage."

"A cabbage!" exclaimed Jack. "I hope you don't believe I'll swallow all you kids tell me"; and then turning to Hiram, he asked: "Hiram, did you hear Harold say that thing the captain has is a cabbage? What do you say to that?"

"I guess I'll hev to say the same thing," said Hiram, enjoying Jack's surprise. "You jest wait till I bile it fer dinner to-day. I calculate that when ye begin to eat it, ye'll say it suttenly tastes like a cabbage, so I reckon it kain't be much of a mistake to call it a cabbage."

"What is it, captain?" inquired Jack.

"It's the tender green bud that grows at the top of a cocoanut palm tree, from which the blossoms appear before the young cocoanuts are formed."

"Gracious, Jack," said Harold in a teasing manner, "didn't you know that?"

"How long have you known it, Harold?" asked Jack good-naturedly.

"For at least ten minutes," said Harold laughing.

"Cap'n," said Hiram, "while Jack and I be finishing the repairs to the boat, I wish ye and the two boys would git to work in making a sail. Ye'll find some sail needles and strong twine in one of the corners of my tool-chest."

Selecting some of the highly colored blankets they cut them into the desired shapes and, sewing them together, made a sail which, as Hiram remarked, was "sarvisable though wery stunnin'."

It took much longer to repair the boat and get it ready for use than Hiram had calculated. Indeed, it was late at night before everything was completed and the food and other stuff packed; for, considerable work was necessary in forming the boom and gaff, and in securely attaching them to the mast.

Next morning, after a good breakfast, seeing that everything they intended to take had been placed in the boat, they pushed off toward the ocean. The wind being in the proper quarter, they hoisted the sail and started toward the east on their voyage of discovery around the island. It was a beautiful day, and the bright sunshine falling on the highly colored sail, with

its alternate stripes of green, blue, yellow, and red, gave to the boat such a picturesque appearance that, taken in connection with their clothes, which by this time were far from new, and their dark, sun-bronzed faces, might have caused a stranger seeing them to conclude that they were not English-speaking people, but some of the primitive inhabitants of the island on a predatory expedition.

CHAPTER VI

Circumnavigation of the Island

They had no intention of permitting Satan to accompany them, but the next morning after the boat had been pushed off from the shore and had gone a little distance from the island, the bird, as if purposely waiting until it would give them some trouble to go back with it, flew toward the boat calling out:

"Another piece here, thank you," and finally rested on Jack's shoulder.

"Shall I send Satan back, captain?" inquired Jack smiling.

"No, Jack," was the reply, "I guess we'll let her go with us. We do not expect ever to be far from the shore, so if she gets tired she can easily fly to the land."

The tide was running down when they started, but there was still a well-marked line of breakers off the coast for the most part. They, therefore, generally kept off the island in the deep water beyond the shore platform. In a few places, however, the breakers were either lacking or very low, so that they were able safely to take the boat near the edge of the shore platform. Here the waters were clear enough to permit them to see small fragments of coral rock, ground-up shells, and coral sand that were being washed toward the

beach. The captain called their attention to this, saying:

"Keep your eyes open, boys. While on this voyage you'll see many things that will aid you in understanding how coral islands are formed. The materials you see being washed up over the shore platform by the waves furnish the limestone from which the island is built. They are thus being added, little by little, to the mass of limestone that forms the island."

"I thought coral islands were built by coral insects, Uncle Arthur," exclaimed Harold.

"That's a very common mistake that I believe the poets are responsible for, Harold," replied the captain. "Coral polyps do not build coral islands. They simply grow in certain parts of the ocean, and while growing take from the waters, along with their food, limey matters that form bones just as you or I do. But they no more live for the purpose of forming limestone than we do for forming bones. Then again, they have nothing whatever to do with forming the island. That is done by the waves. It is the ocean, and not the coral polyp, that is the architect of a coral island."

"Captain," inquired Jack, "is it not a great mistake to call coral polyps coral insects?"

"Yes, Jack," replied the captain laughing. "It is a horrible mistake. A mistake of a whole sub-kingdom; for coral polyps are radiates, while insects are articulates."

In this way they rowed slowly along the island, keeping away from the coast when the breakers were

threatening, and approaching it when they were absent or low. When, however, the tide was at the ebb, and the shore platform was completely uncovered, they were able to hug the shore more closely. At one place, where they could bring the boat to the edge of the platform, they could distinctly see the higher land beyond the top of the beach. Here there was an absence of the vegetation that covered the island immediately beyond the beach in all the parts of the island they had so far seen. This was due to the absence of the coral sand in which the vegetation grew. In its place the surface was covered with huge angular fragments of black-looking rocks confusedly piled together like a vast field of ruins. These fragments were of various sizes, varying from a few cubic feet to a hundred cubic feet or over.

"What kind of rocks are those, captain?" inquired Jack.

"Coral rocks or limestone," was the reply.

"Coral rock!" exclaimed Harold in astonishment. "Why, Uncle Arthur, they are almost black in color."

"Yes," said Jack, "they are not unlike some specimens of volcanic rocks that I remember seeing in the British Museum in London."

"They're limestone for all that," said the captain. "Hiram, we'll land the boat at the edge of the shore platform where the breakers are almost absent. I want to show something to the boys."

When they landed, the captain and the boys got out of the boat, the captain taking a hammer with him.

"Stay and watch the boat, Hiram," he said to the boatswain, "we'll only be gone a short time."

When they reached the pile of rough coral rocks the captain said:

"Be careful how you climb over these rocks, boys. It would be easy to break a bone should you fall between them." Then stopping near a large rock, he struck a portion of its edge a sharp blow with the hammer. That the stone was hard could be told from the metallic sound produced by the blow. Where a small piece was broken off the edge showed that the mass within was of a pure white color.

"Look carefully at this, boys," said the captain. "Some other time I'll explain how coral islands are formed. You have seen enough to know that it is the waves that bring the broken fragments of dead coral from the waters and pile them up on the beach, as well as in the higher lands above the beach."

"Where did these materials come from?" inquired Jack. "Of course, I see they come from the ocean outside the coral platform, but do they come from the deep or from the shallower parts of the ocean?"

"From the shallower parts only," was the reply.

As they stood looking at the confused pile of angular fragments of coral rock, they could see that except at the bottom of the mass there was no sand or soil whatever.

"I suppose you understand, boys," said the captain, "that these heavy rocks could only have been brought here by the strong waves that accompany big storms.

After a while sand, brought by the waves and the winds, will fill the spaces between the stones."

Charley, who had been attentively listening to the conversation, and had then gone a short distance ahead of his companions, came running back to them and said to Jack:

"Jack, if you come a hundred yards farther on you can see where the sand has commenced to collect in the spaces between the rocks."

"Yes," said the captain, after examining this place; "and still farther on we can see where the sand has collected in still larger quantities, and cocoanut trees are growing in it."

"But, captain," said Jack, "how are the solid rocks formed? How are the small particles of coral sand and fragments of dead coral changed into the hard limestone of the coral platform? The coral animals cannot form masses of rock like these, can they?"

"No, Jack," was the reply; and then addressing the boys he added: "You can make up your minds that the coral animals have nothing whatever to do with the formation of coral rock. They simply live and die, leaving the waves and the waters to do the rest with their dead skeletons. You will find in the shallow waters at the edge of the shore platform, nearest the ocean, great numbers of different forms of coral animals. By the action of the waves, aided by fragments of rocks, the remains of these animals are ground into coral sand, or broken into small fragments, which are spread by the waters in fairly even layers

over the regions where the corals are growing. Now the water, resting on this finely ground coral, dissolves out a part of the limestone, and this acting as a weak mortar, gradually, but firmly, cements or binds the mass into a solid rock, thus forming a compact limestone."

"Are the sand beaches ever hardened in this manner?" inquired Jack.

"Yes," was the reply, "sands are solidified by a similar cementing action of the waters. Generally, however, the solidification is not marked except near the top. Beach sandrock consists of more or less regular layers, inclined or sloping toward the ocean. Sandrock of this character may consist either of fine sand only, or of sand mixed with small fragments of limestone that have been worn into smooth, rounded pebbles. In some cases the mass is so completely bound together by the cementing waters that it is nearly as compact as ordinary limestone.

"A somewhat similar, though less compacted rock," continued the captain, "is formed on the piles of drift sand that are heaped together by the winds. Here it is the rain-water that dissolves the limestone and thus forms the cementing mortar."

"Won't you tell us something else about the formation of coral islands, captain?" inquired Jack.

"Not now, Jack," was the captain's reply. "What I have told you must do for the present. I think, however, before we return to Jackson Harbor, or at least after we have thoroughly explored the island itself,

you'll know much more about how coral islands are formed, especially the particular island on which we have been cast. But we must hurry back to Hiram who will wonder what has become of us."

Entering the boat and keeping it near the water off the edge of the shore platform, the captain, turning to the boys, pointed to a number of different colored coral polyps that they could see growing on the bottom in the neighborhood of the edge of the platform. These polyps closely resembled the China asters and chrysanthemums they had already seen on the edge of the lagoon. Calling their attention to some of these peculiarities, the captain said:

"These are the animals that collect from the water the lime out of which the limestone of the island is formed. They belong to a class of animals known as the actinia. The colored rays resembling the petals of flowers are called tentacles, and correspond to arms or legs. In this particular species of animal, as you can see, the tentacles surround a central opening. Look at this specimen," he continued, pointing to a particular polyp, that was cylindrical in shape and over a foot in diameter. "It is only the upper part of this cylinder of limestone that is living; the lower parts are quite dead, and the intermediate parts only partially alive. As the animal grows the cylinder of limestone increases in height, so that at length the living part of the animal is at a fairly considerable distance from the lower end."

The boys were much interested in watching the

movements of the tentacles of the coral polyp to which the captain had called their attention. They were arranged around a central opening that looked not unlike a mouth.

"What do you call that opening, captain?" inquired Charley. "See the arms are moving just as if they were trying to cause the water to pass into it."

"That's the mouth of the animal, Charley," replied the captain. "The animal is feeding, and is causing the water of the ocean to flow through its body. When it has taken from the waters what it needs, you can see that what is left is thrown out of the same opening."

"And is it from such masses of coral limestone that the island is built by the waters?" inquired Jack.

"Yes, Jack, it is from this limestone as well as from various other growths, some of which resemble the polyp we are looking at, and from others that are entirely different in appearance, that all the materials are obtained that are employed by the waves in building the coral island."

As they continued rowing and sailing around the island, the captain said to his companions:

"For convenience suppose we give names to the different parts of the island. What shall we call the coral island on which we have been cast?"

"Let's call it Harding Island from our captain," suggested Jack.

The vote was in favor of this name and was unanimous, except the captain, who did not vote.

"Wall, cap'n," said Hiram laughing, "I reckon ye'll hev to agree, fer the wote was unanimous exceptin' you, who didn't wote."

"All right," said the captain, "I'm obliged to you for the honor," and then continuing he said: "I suppose we all agree to call the reef on which the brig was wrecked, Breaker Reef. What name shall we give to the sand beach on which we landed at the end of our long swim?" he asked.

"Suppose we call it Landing Beach," suggested Charley, which was agreed to.

Landing Beach was situated on the southern coast of the island, about seven miles from its southwestern extremity. When they started to explore the island they had proceeded toward the east.

"And what shall we call the broken pile of limestone rocks we saw on the part of the island where sand had not yet been washed in the spaces between them?" asked Jack.

"Let us call them the Clinker Coral Fields," said the captain.

They continued toward the east for several hours, occasionally approaching the coral platform, though for the most part keeping in the deeper waters off the island.

On one occasion, while sailing at some distance from the beach, they noticed a marked change in its appearance. Approaching the edge of the shore platform, in order the better to examine the distant beach, they saw that it was formed not of fine sand, but of

large pebbles or round boulders of coral rock. The captain explained that this difference was due to the greater strength of the waves at this part; for the water beat so hard against the beach that the smaller particles of sand could find no lodgment and were washed over the top of the beach on the island.

"Let's call this part of the coast Boulder Beach?" suggested Charley, which was agreed to.

They were now nearing the extreme southeastern portion of the island. The tide was still low, so the entire shore platform was exposed. While this, of course, prevented them from approaching the beach in the boat, it gave them the opportunity of seeing at a glance the shape of the platform. It was nearly flat, but rose gently toward the beach. Its width varied from two hundred to three hundred feet, although in some places it was over four hundred feet wide.

As already stated, the name shore platform is given to the part of the coral island that forms a half-submerged reef connecting the ocean with the reef that encircles the lagoon. Over the greater part of the shore platform the waters are so shallow that the reef is completely bare at low tide. There are, however, portions that are always covered with shallow water, the depth of which varies from an inch to about a foot.

On being asked by Jack how this portion of the island had been formed, the captain answered that while it was, perhaps, not quite understood, yet it was probably due to the action of the waves.

"Formations similar to those of the shore platform

also occur on islands formed of sandstone," he said. "In some sandstone islands, flat reaches of sandstone rock, covered by shallow water at high tide, and high and dry at low tide, extend off an island at the base of sandstone cliffs that are perhaps a hundred feet or more in height. That these level tracts were formerly a part of the cliffs they adjoin, can be seen by the fact that at low tide they are continuous with the rock of the cliffs. These tracts vary in width from fifty to a hundred yards."

After a few moments of silence, Jack, who had been thinking about what the captain had told them, said:

"Captain, do you suppose that the platform of coral rock around Breaker Reef was formed in the same manner as the shore platform around Harding Island?"

"I have been giving much thought to that formation, Jack," replied the captain, "and have come to the conclusion that it has perhaps been formed in the same manner as the shore platform. I believe that Breaker Reef is a small island that is entirely separate from Harding Island. Indeed," he continued musingly, as if talking to himself instead of to Jack, "there are some things about Harding Island that I have much difficulty in understanding. There are not only evidences of subsidence about this island, as there are about all atolls, but there also appear to be evidences of elevation."

"I suppose, sir," said Jack, "that is too much for any of us to understand?"

"Perhaps it is just now, Jack," was the reply, "but I hope before long you will all be able to understand such matters thoroughly."

"Does any one know, sir," inquired Jack, "how deep the mass of limestone rock is on the edge of the shore platform, or what I suppose is the same thing, how deep is the mass of limestone that forms Harding Island?"

"That question," replied the captain, "is easily answered. Without attempting to explain just how it has been discovered, I may say there is no doubt that this mass of limestone extends downward for a distance of several thousand feet."

"Do you mean," inquired Jack, "that the coral rock is several thousand feet thick?"

"That's just what I mean," replied the captain.

"Then, of course," said Jack, "the coral polyps are able to live in water at least several thousand feet deep. Do you suppose, sir, that they are living on the entire floor of the ocean, and are thus tending to make the water of the ocean shallower?"

"Not at all, Jack," was the reply. "Some time ago it was generally believed that the coral polyps could live at any depth, and were slowly but surely raising the floor of the ocean and thus making it shallower. Now, however, it can be proved that the coral polyps are unable to live in water deeper than about one hundred and fifty feet."

"I don't understand how that can be, sir," said Jack, "but I will probably be able to understand it after

you have shown us more about the peculiarities of the growth of Harding Island."

"I'll not attempt, Jack, just now to explain this matter. I can do it better after a while. Now, however, I will put a conundrum to you, which, although at first sight, may seem to make it more difficult to understand the formation of a coral island, in reality, throws no little light on the matter. Listen to the conundrum. All fully developed coral islands have the same shape as Harding Island; that is, they consist of a comparatively narrow ring of coral rock surrounding a body of water called a lagoon. And although toward the middle of the lagoon the water is often many hundred feet deep, yet this part was at one time the highest point of land, the top of a hill or, indeed, most probably, the top of a mountain, on an island of ordinary formation."

Charley, who had been carefully listening to what the captain had been saying, and had been making a sketch in a note-book he always carried with him, showed it to the captain, saying:

"Something like this, sir?"

"Yes," said the captain in surprise. "Why, you have marked talent for drawing, Charley. Have you ever taken lessons in sketching?"

"I have taken a few lessons," said Charley. "I like to draw."

"O Uncle Arthur," exclaimed Harold, "Charley does lots of drawing, and does it well too. You ought to see some of his sketches."

"I say, Jack," said Charley, as if to prevent anything more being said about his ability to draw, which was indeed quite remarkable, "that's a pretty hard conundrum the captain has given you to solve," and then turning to the captain, he added: "If I didn't know you as well as I think I do, captain, I should suspect you were kidding Jack, but I believe you are in earnest, are you not?"

"I am, Charley," replied the captain.

"Then, Jack," said Charley, turning to him, "I'm going to run you a race to see which of us is able first to answer the conundrum."

"All right, Charley," said Jack good-naturedly. "If you beat me, I will be glad to congratulate you. But let me tell you you'll have to get busy if you want to win."

When they reached the extreme southeastern part of the island, they found both the shore platform as well as the land of the encircling reef much broader than in other parts. Moreover, the land part of the island was much higher than at Landing Beach.

Shortly before sunset they found something that appeared greatly to please both the captain and Hiram. This was a part of the coast where the shore platform was absent, so that it was possible for them, although the tide was now low, to bring the boat up to the edge of the sand beach, into a species of harbor. It is true it was so small a harbor that it no more than permitted the entrance of the boat. It possessed, however, this great advantage, it permitted them to pass the night on

the beach which they could not otherwise have done; since, if they anchored their boat at low tide at the edge of the shore platform, and then walked across the platform to the island, they would be unable to regain the boat until the next low tide, while, on the other hand, if they landed on the beach during high tide, they would be compelled to wait until the tide was again high before leaving. Moreover, in most places the breakers would have rendered it unsafe to bring the boat, during certain conditions of the tide, to the edge of the shore platform.

The captain proposed to call this harbor, Hiram Harbor, after their boatswain.

That his name should be given to a part of the island appeared greatly to tickle Hiram.

" Wall," he exclaimed, " that suttenly makes me feel proud like. To think that Hiram Higgenbotham should hev a part of a bloomin' island like this named arter him. Ef my dear mother was still livin' she sartinly would hev been proud when she larned that thar was a part of the world named arter her son."

The shore platform was wider and the wooded land broader and higher at Hiram Harbor than at the rest of the island. Moreover, this broader and higher portion extended as far to the north as they could see.

CHAPTER VII

Parker Cliffs. A View of Harding Island from Charles Hill

They were up so early next morning that when through breakfast it was only three-quarters of an hour after sunrise. They had done this at the request of the captain, who wished carefully to examine the part of the island lying between the break in the shore platform and the lagoon.

"If there is an entrance here to the lagoon," said the captain to his companions, "this part of the coast will form an excellent site for our house."

It was now nearly high tide. If there was any connection between the ocean and the lagoon, the water should now be flowing toward it from the ocean. To their great disappointment, however, it soon became evident that no such connection existed. Not that there were no signs of an old channel. On the contrary, they could clearly trace what had once been a channel by its rounded boulders of limestone. But this channel was now high and dry, and so far from inclining gently down toward the lagoon, was inclined upward by a steep rise. They followed the old channel until the highest portion of the encircling reef was reached, which was here at least fifty feet above the level of the ocean. From this point it extended some-

what sharply down toward the lagoon. Here the highest point of land instead of being midway between the ocean and the lagoon, as in nearly all places they had yet examined, was much nearer the latter body of water.

"As of course you see," said the captain to his companions, "here is positive evidence that Harding Island has undergone an elevation. We will probably find still higher land farther on, but let's continue to follow the old channel till it reaches the lagoon."

As is well known, cocoanut palms generally attain their most vigorous growth near the water's edge. There were rows of cocoanut palms on each side of the old channel. The idea suggested itself to Jack that possibly the trees from which these originally sprung commenced to grow along the stream of water that long ago connected the ocean with the lagoon.

"Captain," inquired Jack, "do you think these trees originally grew on the sides of the channel when it was always filled with water?"

Jack's observation appeared greatly to please the captain.

"I think so, Jack," was the reply, "although there have probably been thousands of years since the bed of the channel was suddenly raised. It is certainly probable that the original trees from which these sprung actually began to grow on the sides of the old channel as you suggest."

When they reached the shores of the lagoon they could still trace the old channel extending down toward

its waters. But it did not reach the lagoon. On the contrary, it stopped at the portion of the shore platform that had been elevated with the rest of the island, thus leaving the old sand beach on the margin of the lagoon high and dry, while between the upper portion of the sand beach and the lagoon there was a considerable length of the inner shore platform that sloped abruptly to the waters of the lagoon.

Charley, as well as Jack, was giving much thought to the captain's conundrum as to the middle of the lagoon having at one time been the highest point of of an ordinary island. When the captain again spoke of evidences of elevation, turning to Jack, Charley said:

"Jack, are you still puzzling over the captain's conundrum?"

"Yes, Charley," was the reply, "but I must confess that I'm still far from being able to solve it."

"Then, Jack," said Charley, "see if I cannot help you a little. Of course, you must see that if the bottom of the lagoon in its deepest part was once the highest point of land, say the mountain-peak of a volcanic island, then, of course, the coral island must have been formed by the gradual sinking of this land. Don't you remember, the captain is only surprised when our island shows evidence of rising. If we hope to solve the conundrum we must keep the idea of a gradually sinking island in mind."

The captain, who heard Charley's remark, was both surprised and pleased at the thought the young lad

had evidently been giving to the manner in which Harding Island had been formed.

"That's capital, Charley," said the captain. "Look out, Jack, or Charley will guess the conundrum before you."

"All right, captain," replied Jack good-naturedly. "If Charley beats me I'll promise not to be jealous, but Charley has certainly given me a point that I think will help me no little in solving the riddle."

The wider portion of the beach, adjoining Boulder Beach, extended in an almost due north and south direction to Hiram Harbor. As they sailed or rowed for many miles along this portion of the coast the evidences of elevation became more marked. Here the old shore platform had not only been raised completely out of the water, thus markedly increasing the width of the island, but portions of its slopes could now be seen as almost precipitous walls reaching more than two hundred feet above the level of the ocean.

"Hiram," said the captain, "let's take the boat some little distance out from shore where we can get a better view of the island. Here the cliffs prevent us from seeing beyond them."

When the boat had been taken three-quarters of a mile from the shore they could distinctly see back of the cliffs, the summits of two hills that probably reached three hundred feet or more above the level of the ocean.

"The elevation here is much greater than I had expected," said the captain.

The cliffs, as well as the surface of the island generally, presented the same blackish color, as had the angular masses of limestone at Clinker Fields, or more correctly, this was the color of the bare rocky surface; for, where there was a sufficient covering of soil there could be seen the rich green verdure of the cocoanut palms and other vegetation of the tropical Pacific.

"Do you suppose this part of the island is of coral formation, captain?" inquired Jack.

"I think so, Jack," was the reply. "Indeed, it must be, if I am right in supposing that what we see is the result of elevation."

"Is the island still rising, or is it sinking now?" inquired Jack.

"I'm almost sure," replied the captain, "that Harding Island is now sinking, else how can the coral on the south and southwest coast be living. I think you will find little or no living coral in the waters off the coasts of the cliffs, for here the water is too deep."

"Look out, Jack," exclaimed Charley, "I think I'm beginning to see the solution of the captain's conundrum."

"Uncle Arthur," exclaimed Harold, who had been looking at the walls of the cliffs, "what makes those straight marks on the face of the cliffs? See, there's water dripping down them."

"They are caused," said the captain, "by the rainwater flowing down the face of the cliffs. The water melts or dissolves the limestone of the cliffs as it would if they were formed of sugar, only, of course, it dis-

solves it much more slowly." And then turning to Jack, he added, "This proves that the cliffs are of limestone. I have no doubt we will find great caverns or grottoes both in the limestone of the cliffs and in that of the hills which lie between them."

"Let us call these cliffs Parker Cliffs from the name of the commander of the Ketrel," suggested Jack, which was agreed to.

"Since we are exploring the island," continued the captain, "we must try to find a landing-place where we can reach the top of the cliffs. If we then climb to the summit of one of the hills we can see at a glance the different features of Harding Island, as well as the ocean in its neighborhood."

It was by no means easy to find a place where the cliffs could be readily scaled. However, by continuing farther along the coast toward the northeast, they at last discovered a place, midway between the two hills, where the cliffs appeared to have been partially eaten away by a stream of water that descended to the ocean. Here, before flowing into the ocean, the stream made a sharp bend thus forming a species of breakwater that afforded another harbor large enough to shield the boat from the breakers. It required careful handling of the boat, however, to prevent it from being injured while being taken into the harbor. But they finally succeeded in doing this safely, and anchoring the boat started up the almost dry channel of the stream toward the top of the cliffs. The incline was quite steep. The eroded channel had formed a nar-

row defile through short ridges of rocks, the tops of which were for the greater part far above their heads. Finally, emerging from these depths, they found themselves in a broad valley between the opposite slopes of the two hills. Climbing the hill to their left, which was somewhat higher than the other, they soon reached the top.

They had a splendid view from its summit. The entire island lay in panoramic display below them. They could distinctly see that the island had the shape of an irregular ring of comparatively small breadth surrounding a lagoon or lake. It was now low tide, so that the width of the encircling reef was greatly increased by the uncovered shore platform.

It was indeed a beautiful sight. The island lay before them like a gem in the deep blue waters of the Pacific. A line of white foam, formed by the breakers, extended almost continuously along the eastern coast of the island. Beyond this was the still whiter continuous line of the coral sand beach, while near the sand beach was an almost continuous stretch of verdure, the greater part of which, as far as they could see, consisted of cocoanut palms. Toward the middle of the lagoon the water was almost as blue as that of the outside ocean, but near the shore it presented yellowish and greenish tints, so that the panoramic scene was not lacking in glorious color contrasts.

They could now distinctly see in the lagoon, extending in a nearly straight line from the southeast to northwest, in the general direction of the greatest

length of Harding Island, four smaller islands, the two largest of which, closely resembling each other, were nearer the eastern half of the lagoon, the others, which were much smaller, being situated near them and immediately to the west.

The captain closely examined the islands with his glasses. He then handed them to Hiram, by whom they were subsequently passed to each of the boys.

Examined in this way it could be seen that the four islands in the lagoon were curious reproductions in miniature of Harding Island. Each consisted of a reef encircling a lagoon, although in the smallest of the westernmost islands the lagoon appeared to have dried up. Moreover, in the case of all the islands they could see the white coral beach together with a ring of vegetation on the encircling reef. On all of these islands, as in Harding Island, the vegetation apparently consisted principally of cocoanut palms.

"Let's name the different hills, Uncle Arthur," suggested Harold.

"And the islands also," said Jack.

"All right," said the captain. "We'll begin with the hills. What do you say to Charles Hill and Harold Hill?"

"That suits me," said Charley laughing.

"And me too," added Harold.

"And now for the names of the islands," suggested the captain. "Charley, suppose you name the two largest islands."

"Well, I'll name them the Twin Islands, they look

so much alike. We'll call the westernmost island, Twin Island No. 1, and the other Twin Island No. 2."

"Now, Harold," said the captain, "name the two small islands."

"Let's call them Rompey and Satan," said Harold.

"Better call them the Little Kids," said Jack laughing.

"You can't do it," said Charley good-naturedly, "since the highest points of land on Harding Island have already been named after Harold and myself."

"I guess we'll call them Rompey and Satan," said the captain laughing. "The one nearer Twin Island No. 1 will be Rompey and the other Satan."

"If we can find an entrance to the lagoon from the ocean and so get the boat on the lagoon, we must make an exploration of these islands some time," said Jack.

"Cap'n," said Hiram, "kin ye see enything through the glasses thet looks ez ef there be a break through the reef to the lagoon?"

The captain again made an examination when, handing the glasses to Hiram, he said:

"I can see no break. Toward the southeastern end of the island, however, there is a place where, as we have already seen, the waves occasionally break over the land and run down into the lagoon. As we know, it is not possible to get the boat through at this place."

Hiram made a much longer and more careful examination of the reef through the glasses, and said:

"No, cap'n, I kain't see enything. I guess there ain't no break through the reef."

"Then," said Harold in a disappointed tone, "we won't be able to explore the islands in the lagoon."

"I ain't so sure of that, Master Harold," said Hiram. "Ef I kin find the time I kin easily build a boat that we'll keep on the lagoon. It may be worth our while to do this. Don't you think so, cap'n?" he said, turning to that gentleman.

"By all means, Hiram, we'll build the boat," was the reply. "Think of the many advantages we would have from a boat on the lagoon. It would pay us to build it if it was only to save the time in passing across the lagoon from one part of the island to another, instead of walking around by the encircling reef."

"Then we'll explore the lagoon islands yet," said Harold gleefully.

"Yes," said the captain, "but now there is still a very important thing to do. Let's see if there are any other islands in the ocean near Harding Island."

The captain began to look through the glasses in all directions. But Harding Island was evidently a lonely island in the Pacific. The most careful examination failed to disclose any other land in sight. All around was water, with Harding Island lying immediately below the great blue dome of the heavens that rested everywhere on the horizon.

During this conversation Charley had been making another sketch of the island. When he had completed it the captain said:

"Let me see it, Charley."

"It is only a rough sketch," said Charley apolo-

getically. "There is so good a view here that I thought I had better make another sketch to take the place of the one already made."

"It's a capital sketch," said the captain, examining it while the others leaned over his shoulders and looked at it with him. "Suppose I mark on it the names we have just given to the different parts of the island? Then, after our return, the first opportunity you have you can draw a larger and more careful sketch. And on this we will mark any additional names we may agree to give to other parts of the island.

"Harding Island," continued the captain, "clearly stands alone in the ocean. There is no other island in its immediate neighborhood. Look for yourself, Hiram," he said, handing the glasses to the boatswain.

"Let's get back to the boat. We have now been two days sailing around the island. I don't think we had better spend more than one additional day in getting back to Landing Beach."

"Can't we stay here a little longer and try to find the limestone caverns, Uncle Arthur?" inquired Harold.

"Not now, Harold," was the reply, "we will do this some other day."

Returning through the gorge to the boat, which they did not reach until near sunset, they concluded to remain on the island during the night. They therefore built a fire and got ready for supper.

While Hiram was building the fire, the captain, taking a fishing-line from the boat baited it with a small

fish that had been cast up from the sea by the waves. Climbing to a portion of the coast facing the deep water near the foot of the cliffs, he threw the line into the fairly deep water at that point and soon succeeded in landing a good-sized fish that Hiram said was a species of bonito.

"Is it good to eat?" inquired Harold, when they had taken it to Hiram.

"Jest wait till I fry it," was the reply, "and ef you don't say it's fust-class it'll be because ye don't know what fust-class eatin' is."

The verdict was in Hiram's favor. The night passed pleasantly and after an early breakfast they succeeded in getting the boat safely through the breakers, and proceeded on their journey toward Jackson Harbor, which they reached late at the end of the third day.

There was nothing unusual in the appearance of the remainder of the coast, except that the entire western and southwestern half of the island was very much lower than at the eastern and northeastern half.

As they sat eating supper that night under the temporary shelter they had erected at Landing Beach, Jack asked the captain where, as far as they had yet been able to see during their exploration of the island, was the best site for the erection of their house.

"As far as I now know," said the captain, "I think Jackson Harbor is the best place. However, we cannot be sure of this until we have made a careful examination of the encircling reef itself, especially as regards its animal and plant life."

CHAPTER VIII

The Cocoanut Palms and Birds of the Island

On their return from the circumnavigation of the island, they spent a day in rearranging their goods, improving the temporary shelter they had built in order to preserve them from the tropical rains, in carrying their boat up to the highland beyond the beach in order to prevent its being lost during their absence, and especially in preparing for an exploration of the encircling reef of the island itself.

"How long do you expect to be gone, cap'n?" inquired Hiram.

"That's hard to say, Hiram," replied the captain. "We intend walking around the island, so as to examine carefully whatever is to be found on it, especially its plant and animal life. We must do this in order to get definite knowledge of the character of the island's food supplies. We must also know positively whether any besides ourselves are living here. From what we have already seen, I think we shall find the island uninhabited except by ourselves. I suppose all this can be done in three or four days. Of course it depends on whether we meet with anything that requires an extended examination."

"What'll we take with us?" inquired Hiram.

"As little as possible," was the reply. "Nevertheless

since there is almost sure to be something we'll wish to bring back, we must try to make bags from netting-twine to carry over our shoulders, say something in the shape of a large knapsack, like a fishing-net with a comparatively small mesh. You can show us how to make something we can carry with us, can you not, Hiram?" continued the captain.

"I kin make something like thet, cap'n," was Hiram's reply. "Suppose we begin now."

Since the boys had already been taught by Hiram how to make fishing-nets, they found it an easy matter to make a form of knapsack-net that served admirably for the purpose desired.

"Jack," said the captain, "while I am attending to other things, get out a number of fishing-lines. We shall probably depend largely on fish for much of our food while away from Landing Beach. Don't forget to take a small frying-pan with you, Hiram. Since we shall probably wish to explore some of the limestone caves and grottoes, we will also take a lot of rope and a number of candles."

"Some of them, captain," exclaimed Jack in surprise. "Do you expect to find a number of them?"

"Yes," replied the captain. "From what I've already seen of Parker Cliffs, I expect to find quite a number of caves or grottoes—indeed, more than we'll have time to explore."

Starting early the next morning, they struck directly across the island until they had reached the region midway between the ocean and the lagoon, when they con-

tinued walking toward the southeast, keeping generally midway between the two bodies of water.

As they had already seen, both from the brief visit made to this portion of the island when they first landed, as well as when they had examined it with the powerful field-glasses from the top of Charles Hill, this part was covered with a rich tropical vegetation consisting largely of cocoanut palms.

But, besides the palms, there were two other trees that especially attracted their attention. One of these was provided with large, conspicuous, spiny-edged, sword-shaped leaves, arranged spirally in three rows near the top of several awkward-looking but large trunks or branches. This tree was the pandanus, or as it is commonly called, the screw-pine, the latter name being derived from the spiral or screwlike arrangement of its leaves. This grouping of the leaves can best be seen when, as is sometimes the case, the tree consists of a single trunk. Generally, however, there are several trunks, but the long, drooping, spiny leaves give to the tree a characteristic tropical appearance. Some of the specimens of this tree reached the height of nearly thirty feet. The tree closely resembled a gigantic pine-apple, and appeared to thrive remarkably well in the shallow, sandy soil of the island.

There was a feature about the screw-pine that struck Harold as being extremely odd. Near the lower part of the trunk, a short distance above the ground, the tree had sent out a number of strong aerial roots that growing downward soon reached the soil, and then

continuing to grow, served as prop-shaped appendages that not only gave the tree the appearance of having been raised out of the ground, thus exposing its roots, but also served to support the slender stalk by increasing the diameter of its base. Some of these roots that had issued from the side of the tree at a distance considerably above the ground, could be seen swinging to and fro in the air. Finally reaching the ground these, in their turn, would firmly fix themselves in the soil, thus still further broadening the support of the tree, as seen in the mangrove tree represented at the right of the screw-pine shown in the accompanying figure.

Palmlike Pandanus or Screw-pine (Gray)

"What a queer-looking tree," said Harold, pointing to one of the screw-pines, in which the aerial roots were well developed. "Those roots are like those I have often seen near the bottom of tall cornstalks."

Another curious feature about the screw-pine consisted in the globular, or almost spherical balls seen hanging to the branches. These curious-looking masses

attracted Jack's attention, so turning to the captain he inquired:

"Does this tree bear anything that can be eaten?"

"Yes," was the reply. "The balls you see hanging to the tree form its fruit. They consist of dry seeds, most of which are quite large, having a volume of about two cubic inches."

"Do I understand you," exclaimed Jack in astonishment, "to say that those things are fit to eat?"

"They are," said the captain, "provided one cannot get anything better. They possess a somewhat sweetish taste, not unlike a green cornhusk. I understand that on some of the islands of the Pacific, when nothing better can be obtained, this fruit is much employed as a food."

Another tree that also attracted their attention was somewhat higher than the screw-pine. This tree, the pisonia, some specimens of which attained a height of over thirty feet, presented a very beautiful appearance since it was covered with bright flowers, and possessed a handsome foliage.

Besides the trees there were numerous creeping plants, one of the most beautiful of which bore a quantity of attractive yellow flowers.

It was shortly after noon when they reached a point on the island midway between Landing Beach and Boulder Beach. Since all were hungry, they stopped for dinner near one of the largest trees of a grove of cocoanut palms.

"As, of course, you have seen," said the captain,

" the cocoanut palm is by far the most important of the trees on the island. Indeed, it produces so many things of value to man that, as has often been pointed out, it may be regarded as consisting of a dozen or more trees rolled into one. We are hungry, so I think we'll rest here for a while, for we shall be able to find in some of the ripe cocoanuts enough to make a very substantial meal. We will not attempt to cook anything, since so much work remains to be done before we walk completely around the island. While we are doing this Hiram and I will tell you some of the many uses of this wonderful tree."

" Cap'n," said Hiram, " ef we are going to larn the lads something about this here tree, suppose I cut it down; we kin then get at it easier. Ef course, I know it would be foolish to cut down a tree regular when we wish to get its nuts; fer this would destroy a wery waleable thing."

" All right, Hiram, we'll cut one down now. Of course, as you say, we must not make a practice of doing this."

" Captain," said Charley, " if you only wish to get some of the cocoanuts, I am sure Harold and I can shin up that tree and throw down as many as you wish."

" Thank you, Charley," was the reply, " but we wish to examine the leaves and all parts of the tree, as well as the nuts in their different stages of growth, so I think we will cut it down. You see this tree will be like an immense book. Consequently, it is necessary

to have it on the ground where we can conveniently get at all the information it contains."

Hiram soon cut down the tree. As the captain had asserted, they found on it cocoanuts in all stages of growth; there were fully ripe as well as ripening nuts; there were the green or unripened nut, the flowers or blossoms from which the nut would spring, and, last but not least, there was the green bud that would eventually produce other flowers.

"Now," said the captain, "let's begin the lesson. Each member of the class will select a large thoroughly ripened nut. Such as this," he continued, pointing to a nut of this description.

"Now, I call this first-class teaching," said Charley laughing.

The captain then showed the class how to remove the husk from the nut.

While the method of teaching adopted by the captain undoubtedly possessed many advantages, yet when every one in the class, especially the three hungry, growing boys had already been taught how to extract the sweet watery milk from inside the nut, it was not without its disadvantages. Every one in the class was beginning to make an opening in the largest of the three black scars at one end of the shell.

"Stop," said the captain laughing, "the class has not reached that point yet. You all see those rounded black scars, especially the large one which, as you have already learned, is the proper one to open when you wish to suck out the milk?"

"We do," shouted the three boys in unison.

"And what do you suppose the largest scar is good for?" inquired the captain.

"To get at the milk," was the unanimous reply.

"Not at all," said the captain. "How about the thousands of nuts the trees have borne before we came to the island?"

"Don't try to guess, Harold," whispered Charley. "He'll tell us if we only wait, and then we can dig through the larger scar and get the milk all the sooner."

Jack, who had overheard Charley and who, to tell the truth, also felt more interested in the contents of the nut than in the answer to the captain's question, was also silent. So the captain, somewhat surprised at their apparent lack of interest, did just what Charley asserted he would do, and said:

"It is through the largest of these holes that a green sprout issues from the cocoanut when it falls into proper soil, and germinates or begins to grow; for, as you probably know, the cocoanut is the seed from which the cocoanut tree springs.

"Now," continued the captain smiling, seeing that the thoughts of his class were apparently deeper down in the nut than on the surface, "you may now proceed to investigate what lies beyond the largest of the three rounded black scars."

The class apparently did not think it necessary on cutting an opening through the scar referred to to make a more careful examination of the sweet juice

than what they could ascertain from permitting it to trickle slowly down their throats. If, however, the countenances of the investigators could be regarded as trustworthy, the character of the liquid met with universal approval. There was, however, possibly one objection, which was that even the large nuts they had selected did not contain much more that about a pint of the delicious liquid.

"The class will now break the nut and still further investigate its contents," said the captain.

"This was soon done, and all were busily engaged in eating the delicately flavored kernel or meat that lay immediately under the shell of a thickness of about an inch.

"By grating this kernel," said the captain, "a milky juice richer than cream is obtained, and from this cream a rich fatty substance known as cocoanut butter."

"Arter awhile," said Hiram, "when we start to cook and git ready fer the night, ef we kin catch a good mess of fish in the waters of the reef, I'll fry some of them in this kind of butter. And," he added, "ef we kin git some birds' eggs further on, which is almost sartin, I'll cook an omelet, which I think ye'll agree is fust-class. Then, ez I brought some tea and a pot, I'll brew some tea in which we'll use some of the cocoanut cream."

"But, Hiram," said Charley laughing, "how will we drink the tea? In our hands?—for we brought no cups."

"Why, in cocoanut shells, of course," said Hiram grinning. "And I'd advise each of ye to bring his cup along."

They shaped the remainder of the cocoanut shells into cups which each put in the knapsack-like net they had brought for carrying things.

"I like the last part of the lesson very much, captain," said Charley laughing. "It is certainly comfortable to be able to eat your book after you have used it, since it then can never bother you afterward."

"Unless," suggested Jack, "you make a pig of yourself. Captain," continued Jack, "do cocoanut palms spread from one island to another by means of nuts sown by the waves?"

"It is not certain, Jack, that a cocoanut tree sows its own fruit except in the immediate neighborhood of the tree," was the reply; "for, if the nuts fall where they find a proper soil, they will, of course, germinate and take root. They may, of course, be carried from place to place by the waves. If not too long in the water, and if not injured when being thrown on the beach and, moreover, if they reach a soil suitable for their growth they will probably grow. It is doubtful, however, if this method of sowing is often successful."

"Does it take a long time for a cocoanut tree to bear fruit after it begins to grow?"

"No," said the captain, "I understand from my reading that a tree begins to bear fruit in from five to seven years. It continues bearing, however, from seventy to eighty years."

"About how many nuts does a cocoanut palm generally bear?" inquired Jack.

"Your question could not be answered by the number of nuts found on a tree at any one time, since ripe nuts are to be found on trees at all seasons of the year, as well as the immature or green nuts, and the blossoms, and buds from which the blossoms are produced. I understand, however, it is the experience of the islands where cocoanut trees are grown for the sale of the nuts they produce, that the yield of a healthy tree will vary from eighty to a hundred nuts per year."

"Hiram," inquired Jack, "is the partially green nut fit for anything?"

"Wall, my lad," said Hiram laughing, "I believe thet ef the milk or liquid in the nut is set aside fer a while it makes a drink thet fizzles like soda-water."

"Yes," said the captain, "and the creamy pulp contained in the green nut produces a far richer cream than the ripe nut does.

"But," continued the captain, "we have not begun to exhaust the useful substances produced by this remarkable tree. As you know, the green bud produces something very much like a cabbage. The juices from this bud are very sweet, and yield a variety of molasses. Moreover, by fermenting this molasses an alcoholic liquor is produced."

As the conversation continued they learned either from the captain or from Hiram about a number of other useful things the cocoanut palm produces.

Among these was the use of the fibers of the husk for cordage, twine, and threads; the use of the wood of the trunk of the tree for clubs, spears, etc.; the use of the leaves for thatching, for weaving coarse mats, and of the finer fibers for the making of ornamental mats, as well as articles of clothing.

But the vegetation was by no means the only form of life on the island. They saw many varieties of birds, either during their three days' walk around the island or on subsequent occasions. Some of these caused no little fright to Satan, who accompanied the party on this discovery as well as when they circumnavigated the island. Every now and then Satan would seek Jack's shoulder as a place of refuge when some ferocious bird came in view. We can now briefly allude to only a few of the more important of these birds of Harding Island.

In the first place there were several species of birds called tern, that, as they afterward learned, visited the island twice a year for the purpose of breeding. These birds build no regular nests, but lay their eggs in tufts of grass.

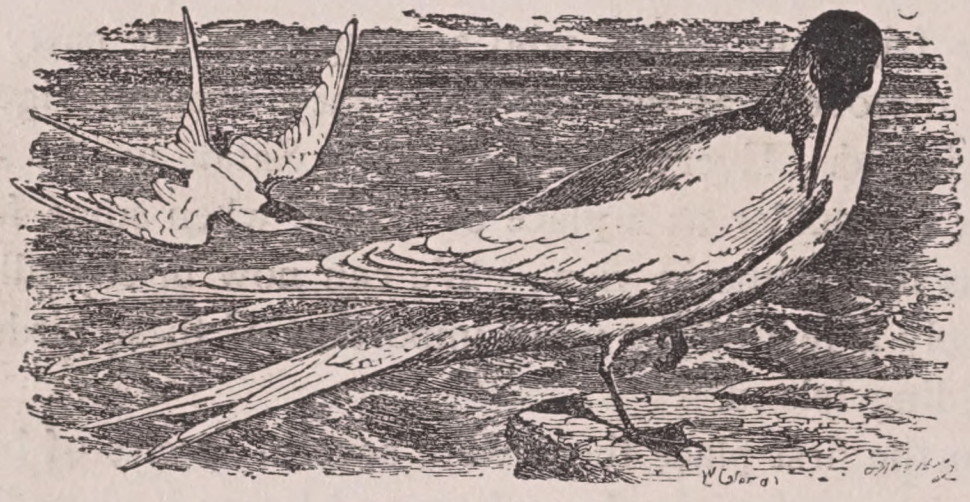
As we have already remarked, Hiram, although an uneducated man, was well up in the natural history of the many animals he had observed in the different parts of the world. They were now in a part of the island where there were many tufts of grass growing in the sandy soil immediately above the top of the beach facing the ocean.

Turning to Charley, Hiram said:

"Mr. Charley, would ye like an omelet fer supper?"

"Cooked with cocoanut butter as you were talking about to-day at noon?" replied Charley. "Show me the omelet, Hiram, and I'll show you the eating."

"All right, my lad," was the reply. "See here," he said, stooping down and picking up several eggs that lay on a tuft of grass. Ye'll find a-plenty of 'em here. They be terns' eggs, and are wery good eating provided they beant too near hatched."



Tern or Sea Swallow

"On what food does the tern live, Hiram?" inquired Jack.

"On fish they ketch fer out at sea," was the reply.

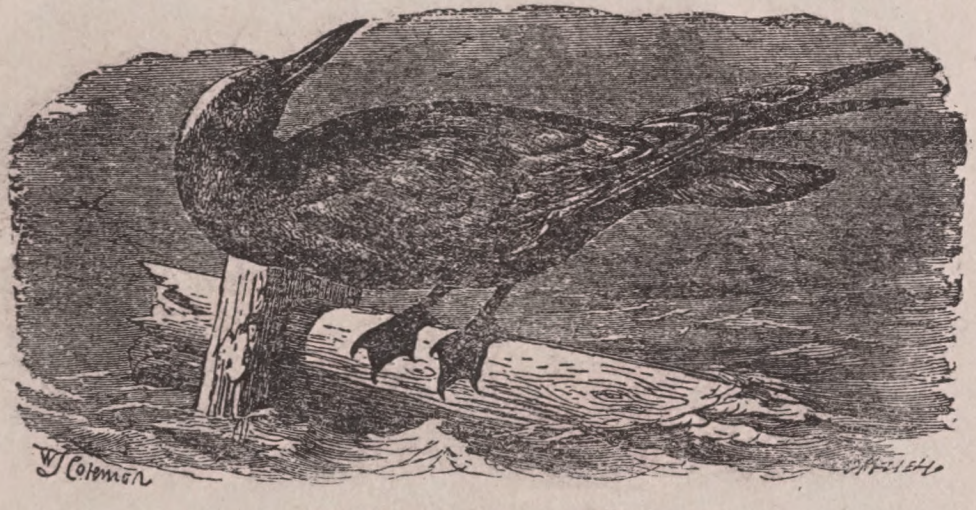
"Are those tern?" inquired Harold, pointing to some birds that were resting not far from them on the coast. "They look like the swallow."

"Yes," replied Hiram; "they be sometimes called the sea-swallow."

As they afterward had an opportunity of seeing, the tern, or sea-swallow, when full-grown, has a jet black

plumage at the top of its head and nape of the neck. The upper part of its body is an ashen gray, while the under surface and the wings are pure white. The bill, however, as well as the legs and the feet are of a coral red, the bill deepening in color to a black near the tip. Counting the length of the long tail feathers these birds were rather more than fourteen inches in length.

Then there was a variety of birds with black plumage, somewhat larger than pigeons. They were



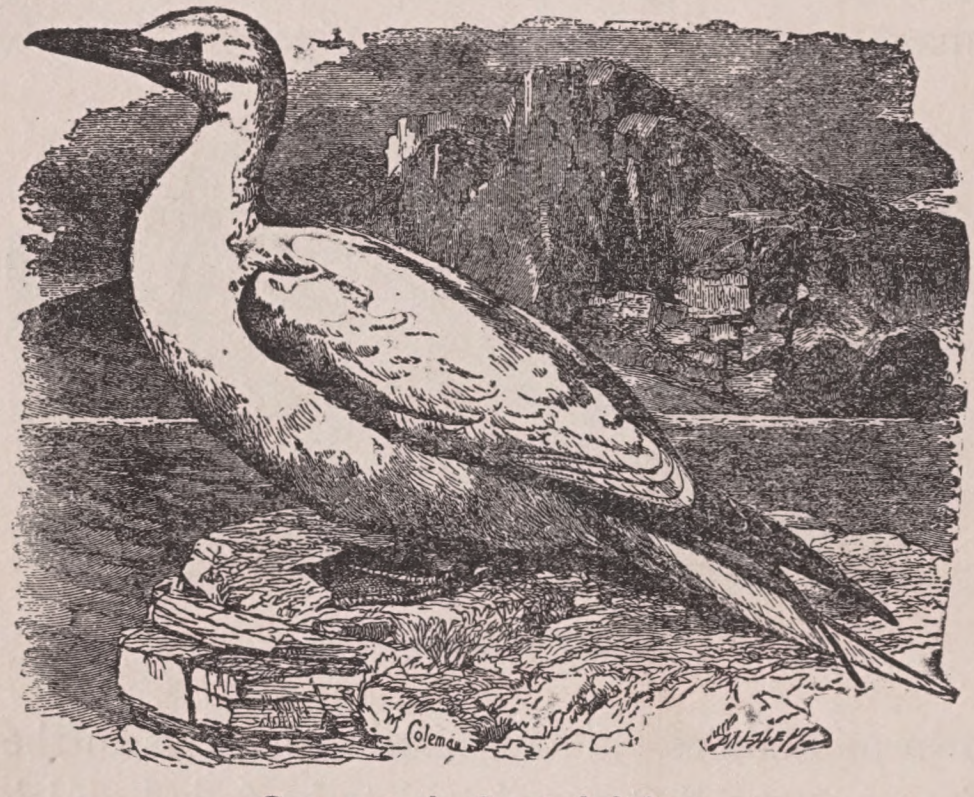
Noddy, a variety of Tern

known as noddies. They make their nests in the deposits of guano that are always to be found on islands visited by large flocks of birds.

The noddy, in reality, is a species of tern, and more closely resembles the nighthawk. This bird often lights on vessels by night, and has been known in several cases to have saved the lives of sailors perishing for want of provisions.

A peculiarity about the noddy is the character of its nest. The bird is in the habit of returning to the same

nest year after year. The nest is, therefore, situated on heaps of guano in a shallow bed of seaweed that, accumulating, reaches a height of about two feet above the ground. It is a clumsy looking affair, exceedingly dirty, and possesses a disagreeable odor. The eggs are of a dark orange color with splashes and spots of red and purple.



Gannett or the Spectacled Goose

The odor and the dirty condition of the nest were very disagreeable to Harold, who remarked:

"I wouldn't care to eat any of those eggs."

"They be better than they look, Mr. Harold," replied Hiram grinning. "Wait 'till ye eat 'em cooked."

Unlike the tern, the noddy has a dark-colored plumage. The forehead and top of the head is buff col-

ored, the back of the head a dusky gray, and the remaining plumage a chocolate brown. The legs, feet, and bill are black. The average length of the bird is from fourteen to fifteen inches.

There were two other species of birds called gannets and boobies, that also make their nests on the ground. They were large birds that were skilful in catching fish. Indeed, they were so quick in their movements that they could catch the flying fish as they leaped out of the water. They were also skilful divers, and plunging beneath the surface of the water would seldom fail to bring a fish out with them. Although quick in the air and the water, they were so awkward on the land that they could be easily caught.

The gannet was by far the largest of the birds in the neighborhood. It was nearly three feet long, and closely resembled the goose. Indeed, as Hiram told the boys, the gannet is sometimes known as the solan or the spectacled goose.

The gannet was so swift a flyer that it had no difficulty in obtaining abundant food from the shoals of fish in the waters both near and off the island. The gannet lays a pale-blue egg. When full grown the bird has a white plumage, with brown-black beak and legs and few dark-colored feathers in their wings.

The color of the booby is brown above and grayish-white beneath. These birds take their name, boobies, from their stupidity, not apparently having enough sense to protect themselves from the attacks of frigate birds or of men.

The frigate bird, sometimes known as the sea-hawk or the man-of-war bird, is one of the most beautiful birds of the tropical waters of the South Pacific. It possesses a rapidity of flight far exceeding any of the other birds. When flying vertically upward from the water it moves so rapidly that it soon becomes a mere speck in the sky.

The plumage of a full-grown frigate bird is a deep

Frigate Bird or Sea Hawk

black crossed with green. The female is dull black above and white streaked with cinnamon on the head, breast, and under parts of the body. The pouch on the throat is scarlet, and when distended it produces a curious contrast against the dark black of the neck and throat. The pure black, long tail feathers are highly esteemed among the inhabitants of the Society Islands and other islands in the neighborhood for forming the headdresses of their chiefs. The body of the bird is

quite small, but including the long tail, the male sometimes attains a length of three feet.

This bird especially attracted their attention. It received its name, the frigate bird, because it gets its living entirely by stealing from other birds. They watched this bird hover high in the air, waiting until one of the fishing birds returned to the island from the ocean with fish in its beak, and would then dash ferociously at the bird until in fright it dropped its prey. In nearly all cases the frigate bird was swift enough to catch the fish before it reached the surface.

Many of the birds, especially the gannets and boobies, did not seem to associate with the other birds, but lived by themselves in separate parts of the island.

When they stopped for dinner and the night toward sunset, they had no difficulty in catching a mess of excellent fish, consisting of a species of sole or flounder.

When fried in the cocoanut butter the fish made capital eating, as did also an omelet of eggs similarly prepared. After supper they sat awhile by the side of the fire talking, and on afterward retiring were soon in deep slumber, for they were all tired by the exertions of the day. Not yet knowing what, if any, dangers were to be met on the island, they took the precaution to divide the night into watches.

CHAPTER IX

The Limestone Grottoes of Parker Cliffs

Next morning, after an early breakfast, they continued the examination of the island. Boulder Beach, as already mentioned, extended almost due north and south to Hiram Harbor. Wishing to examine this beach, which took its name from the almost entire absence of fine sand, they walked along its edge as near the ocean as they could without getting wet; for the breakers at this part of the island, which was the windward side, were stronger than any they had yet seen, except during the stormy weather of their landing. It was evident that the absence of sand and the presence of the boulders were due to the fact that the sand that was washed up from the shore platform did not remain between the separate blocks, but was carried by the force of the waves beyond the top of the beach. They were not surprised, therefore, that the soil on the land adjoining this part of the beach was deeper than elsewhere, and that, owing to this, the vegetation, especially that of the cocoanut palms, was unusually luxuriant. Moreover, the beach extending along the shores of the lagoon in this part of the island, as well as the bottom of the lagoon near its edges, was quite sandy.

The waters of the lagoon were very clear, so that they could see a great variety of fishes. Among these they were greatly astonished to see a number of full-grown sharks.

"I do not understand how sharks can get into the lagoon," said the captain. "Their presence would seem to show that there is an opening somewhere between the ocean and the lagoon."

"I kain't onderstand it either," replied Hiram. "We could see no sech opening when we examined the reef from the top of Charles Hill. Howsumever we'll keep a sharp lookout, and ef such an opening exists we ought sartinly to find it."

Both in the waters of the lagoon, and especially in those of the reef outside the island, they had no difficulty in catching a mess of excellent food-fish. Therefore, as the captain remarked, they could count on obtaining an abundant supply of sea-food.

Continuing toward the north along the wider portions of the reef at Parker Cliffs, they found places where they could safely walk along the edge of the cliffs; in other places, however, the cliffs had been so eaten away by the waves and the rain-water, that the edges had broken off and fallen into the ocean. They continued advancing toward the north until they reached the valley lying between Harold and Charles Hills.

At this part of the island, on certain portions of the higher land, there were sand-drifts of considerable size. Here, the depth of the soil being great, there was an especially luxuriant vegetation.

They never had any difficulty in obtaining an abundance of pure cool water for drinking. A shallow pit, four or five feet in depth, dug almost anywhere in the sand, was soon filled with good water that drained into it from the sides.

"Why is it, captain," inquired Jack, "that water is reached so near the surface on coral islands, while in almost all other parts of the world wells of fairly considerable depth must be dug before the water can be obtained?"

The captain explained that the island, at comparatively short distances below the surface, consisted of a hard, compact limestone through which the water was almost as unable to sink as it would be through a well-glazed plate of china or earthenware. A comparatively shallow deposit of coral sand rested on the top of this impervious material. When the rain fell it rapidly sank through the soil until it reached the impenetrable rock, so that the soil, up to within four or five feet of the surface, soon became water-logged. Necessarily, therefore, holes dug in the water-soaked soil were soon filled with water that filtered in from the sides.

The captain also explained that the white color of most of the soil of the island prevented it from rapidly absorbing the sun's heat. The loss of water by evaporation from the surface was, consequently, less than in ordinary soils.

When they reached the valley midway between Harold and Charles Hills, they proceeded slowly down the bed of the stream that drained their slopes. They

planned to follow this channel to the coast, since here they expected to find a number of grottoes and caverns in the limestone of the cliffs.

Reaching the ocean near the break in the cliffs, they walked along the shore toward the north until they reached the place where the land descended precipitously to the water. Here they had an opportunity of closely examining the verticle groovings or furrows formed by the rain-water pouring over the edges of the precipice.

"I never knew that rain-water could dissolve limestone," said Harold.

"The water contains a small quantity of carbonic acid gas," said the captain, "and therefore is able slowly to dissolve the limestone so as to form vertical channels. But, besides this action which takes place on the surface, the rain-water also sinks into the rock at its joints. If the water is unable to escape below, it simply fills the crevices and then continues pouring over the face of the precipice. But if, as is often the case, the water can escape below, it continues entering the ground at the joints and erodes or eats out the limestone beneath as well as on the surface. Where the water enters the limestone there is formed a deep hole called a sink-hole or swallow-hole.

"The water that enters the sink-holes," continued the captain, "either escapes through openings in the face of the precipice, or flows along the inclined layers as underground streams and, continuing to dissolve the limestone, forms caverns.

"Underground streams, like those on the surface frequently empty into a common channel. In this way there is formed an underground stream that may extend for miles through the limestone rock at a considerable distance from the surface. Such a stream may flow through extended caverns, whose roofs are hundreds of feet above the bed. This is especially the case at the sink-holes which, though sometimes but a foot or so in diameter at the top, yet open out far below the surface into spacious chambers."

As they closely examined the precipitous walls of limestone, they could see in many places that so much of the lower portions had been so worn away by the beating of the waves, during storms or high winds, that the tops of the cliffs threatened to fall into the ocean. Indeed, in several places this falling had actually taken place, as could be seen from the fragments of limestone that lay piled up below.

As the captain predicted, they had no trouble in finding plenty of caverns. At numerous places on the walls of the precipice there were openings extending directly into it, but these openings were too dark to permit them to see how far they extended. From most of them water was escaping into the ocean.

Selecting an opening from the mouth of which a large stream of water was flowing, they lighted their candles, and entering, began walking along the sides of a fairly deep stream of water that inclined gently upward.

The air grew perceptibly colder as they penetrated

deeper and deeper into the wall of the precipice. In a short time they had to depend for light almost entirely on the flames of their candles. Toward the entrance they could see the dim circle of light only that marked the outlet where the stream escaped from the cavern and ran into the ocean, and soon even this light disappeared.

"Try as far as possible," said the captain to his companions, "to remember the direction in which we are walking, whether parallel to the opening, directly toward the lagoon, or in some direction between the two. This knowledge may prove of great value."

There were marked differences in the height of the roof of the cave through which the stream flowed; in some places it was hundreds of feet above the channel, while in others it was so near that they were obliged to creep in order to get through. Occasionally, they came to places where the stream flowed through immense chambers or caverns, the roofs of which were so far above their heads that they could only dimly discern them. In most of these, beautiful icicle-like masses of pure white limestone could be seen hanging from the roof, while immediately under them were hillocks of the same substance.

"Of course," said the captain to the boys, "you know what these are?"

"I've read about them," said Jack. "Those hanging from the roof are called stalactites, while those immediately below them are called stalagmites. The stalactites are formed in a manner similar to the icicles

on the eaves of roofs or similar places. As the water containing dissolved limestone slowly drops from the roof, small particles of solid limestone are deposited and in this way pendants are formed. At the same time the water dropping on the floor immediately below, builds up hillocks called stalagmites. Sometimes the stalactites grow downward and the stalagmites upward until they join, thus forming huge pillars that aid in supporting the roof."

"That's right, Jack," exclaimed Charley, who had gone a little distance ahead, "here are many such pillars."

In the direction indicated they could see a number of columns or pillars extending between the roof and the floor of the cave. They varied in thickness, and in some places were so close together that it was difficult to force a passage between them.

Several hundred yards farther up the stream a portion of the cave was reached where one of its walls was nearly vertical. Here, by an apparent chance that seems so frequently to characterize the works of nature, but which, when properly understood is devoid of any chance whatever, a number of parallel stalactitic pillars had been formed against a portion of the vertical wall. The pillars were of unequal length and closely resembled the pipes of a huge organ. Beneath a huge stalactite that hung gracefully from the ceiling, a stalagmite had been heaped up that bore a wonderful resemblance to a huge pulpit. The combination of organ-pipes and pulpit caused this portion

"The pillars . . . closely resembled the pipes of a huge organ."

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of the cavern to resemble a corner in a huge cathedral, with its pulpit placed a little to one side, but in front of the grand organ.

About ten minutes' walk beyond the cathedral they heard a noise like that of falling water.

"That sounds like a waterfall, Uncle Arthur," exclaimed Harold.

"Yes, Harold," was the reply, "waterfalls are not unusual in caves of this character."

Walking in the direction of the sound, which took them a distance of one hundred yards from the stream, they came to a place where a stream greater in volume than the one they had been following, was pouring over the top of a cliff, probably twenty feet in height. They were surprised to see that this water did not empty into the stream they had just left, but took a different path running down a fairly steep incline to a much lower level.

"This is very interesting," said the captain; "this stream belongs to a different drainage system. Suppose we follow it, but be careful you don't slip," he added. "The rocks are smooth and the stream is deep enough to drown you."

Descending the stream, as well as they could roughly estimate for a hundred feet, they found that it poured over a low bluff about two feet in height, emptying into a larger stream than any they had yet seen. This stream was flowing with a great velocity.

Charley, who had gone ahead of the others had already reached the bluff over which the stream from

the waterfall flowed into the larger stream. At this moment, Harold, who was immediately back of Charley, stumbled and slipping was carried over the bluff into the larger stream. This was so deep that he completely disappeared, for the water was considerably over his head. Fortunately, Charley, who was stooping down looking into the water caught him by the hair of his head as he came to the surface and tried to pull him out. But the current was so strong that he was unable to do so, and had it not been for Hiram, who was almost immediately back of Harold, both boys would probably have been carried away by the swift current.

Fortunately, no other harm had been done to Harold than a thorough wetting. As soon as he recovered from his surprise he turned to the captain, who had by this time joined them, exclaiming:

"Uncle Arthur, did you not say it was rain-water sinking into the ground at the surface that dissolved out the limestone and formed this cave?"

"Yes, Harold, that's right; why do you ask?"

"Because," said Harold, "if that's so, then it must rain salt water in this part of the island."

"How is that," said the captain in surprise.

"I got a mouthful when I slipped into the big stream," was the reply. "It's as salt as the water of the ocean."

Harold's companions were as much surprised as he had been, and began immediately to taste the water of the stream that had come from the waterfall, and found

it perfectly fresh. Then dipping their hands in the waters of the larger stream they found, as Harold had declared, that it was as salt as the waters of the ocean.

"There is an underground connection between the ocean and the lagoon," said the captain. "This is the explanation of the presence of the sharks in the lagoon. Do you remember, Hiram," he said, "in what direction the lagoon lies from this place?"

"Ez fer ez I kin remember," replied Hiram, "this stream is running straight toward the lagoon."

"That," said the captain, "is my recollection," as indeed it was also the recollection of the three boys when asked.

"Captain," said Charley, taking something out of his knapsack, "here's a piece of cork I picked up this morning on Boulder Beach. I brought it along thinking I might use it as a float for our fishing-lines if we should fish in shallow waters. Suppose I throw it into the stream? If we find it afterward in the waters of the lagoon it would, of course, prove that this stream enters the lagoon."

"That's a good idea, Charley," said the captain. "Mark your initials on it, so that there can be no doubt about it should we find it again."

Marking C. Y. P. on the cork, Charley threw it in the water when, floating rapidly past them, it soon disappeared in the darkness.

They had now been in the caverns under Parker Cliffs for nearly two hours, so determining to return to

the sunlight, they retraced their steps and, since they had the two streams to follow, found no difficulty in reaching the opening through which they had entered.

During their wanderings they had all on several occasions thoroughly wet their clothes by slipping into the stream. Besides this, both Charley and Harold had received several duckings.

The warmer outside air was very pleasant when they finally emerged from the opening of the cave. They made an effort, although unsuccessfully, to find the place where the waters of the ocean entered the lower part of the limestone cliffs. Their failure to do this, however, was probably due to the fact that it was then high tide.

" Since we are all more or less wet," said the captain, " we'll make our way to the shore of the lagoon, take a bath in the shallow water near the shore, and spread out our clothes in the sun to dry."

Retracing their steps up the gorge to the top of the plateau they were obliged to walk nearly a mile to the north before they could descend to the lagoon, for this side of the plateau was as precipitous as it was on most of the side facing the ocean. At last, however, they reached the lagoon and, selecting a place where the water was shallow and the bottom was sandy, were soon enjoying a pleasant bath.

It is interesting to note that several hours afterward while wandering along the shores of the lagoon near the precipice, they found floating in the water near the shore of the lagoon the identical piece of cork, marked

with Charley's initials, that had been thrown into the underground stream.

"We know now to a certainty that there is an opening between the ocean and the lagoon," said the captain. "But," he added, turning to Hiram, "I don't think any of us would care to take the boat from the ocean through that opening into the lagoon, do you, Hiram?"

"No," said Hiram smiling, "thet'd be wery dangerous."

As soon as their clothes were dry they dressed, ate dinner, and proceeded toward the west, examining the land between the ocean and the lagoon. They saw nothing new in this part of their route, but were pleased to find an abundance of cocoanut palms and other trees, an abundance of fish, both in the lagoon and in the ocean, as well as numerous flocks of birds, of the same character as those observed on the southern coast. In order to make up for the time spent in the caverns of Parker Cliffs, they walked rapidly, camping for the night at a point on the northern part of the island about midway between its eastern and western coasts. Nor did they find during their next day's exploration anything new, except that the western or leeward coast of the island, probably owing to its being protected by the higher land, was much lower than the windward coast. This part of the island was covered with vegetation throughout its entire length, except for occasional patches of no very great extent.

The western or leeward coast was comparatively free

from heavy breakers, so that, as they had observed during the circumnavigation of the island, there would be much less difficulty in landing a boat here than elsewhere.

In all their wanderings along the coast of the ocean they had found no better harbor than Jackson Harbor. It is true that Hiram Harbor afforded a shelter and, when the boat was once safely in it, was well protected against the breakers. But the breakers here were higher and stronger than at Jackson Harbor. Moreover, Hiram Harbor was difficult of access, while Jackson Harbor could readily be entered at all tides.

"We will build our house at Jackson Harbor," said the captain. "Fortunately, it is near Landing Beach so that the work of transporting our goods will not be great."

They reached Landing Beach early in the afternoon when they were welcomed by Rompey, who had been left to guard their goods. The animal had evidently been very lonely, and was greatly pleased to see them again, especially his young masters.

CHAPTER X

The Erection of Jackson House and the Building of a Boat

The next few weeks were spent in erecting a living-house at Jackson Harbor. Here the highest point of land did not exceed twenty feet. As the captain remarked, the small elevation was a great disadvantage. Although the house would be beyond ordinary waves, yet it might readily be reached by the waves of a very severe storm and, of course, should a high earthquake wave from the ocean strike the island, the house would almost certainly be completely washed away. Nevertheless, an advantage of the site was its nearness to the best harbor yet discovered on the island. Then too it was quite near Landing Beach where they had temporarily stored the goods obtained from the wreck of the brig. Besides, as the captain suggested, at some later date they would probably erect another house on some part of the higher land in the neighborhood of Parker Cliffs.

"It would be easy to pass from one house to the other," said the captain, "since as soon as we are through the erection of the house at Jackson Harbor, we'll begin building a boat for use on the lagoon when, of course, we'll carry such things as we may need for

the house on Parker Cliffs directly across the lagoon in the boat.

The building of a house is generally an operation that requires considerable time, but in this case the difficulties were lessened by the fact that the timber recovered from the brig consisted for the greater part of different portions of good-sized portable houses intended for use, as has been said, in the towns that were springing up in the neighborhood of the recently discovered mines of South Africa. The timber was in the form of regular mill-work, such as door-frames, window-frames, window-sash, flooring-boards, joists, rafters, the parts of stairways, shingles, etc., all ready to be put together. The work, therefore, went on rapidly. As they had collected material for several portable houses, they concluded to give themselves plenty of house room at Jackson Harbor, so they began the house by placing two portable houses end to end. The front of one house faced the ocean and the front of the other the lagoon. This possessed the advantage of bringing the kitchens of the two houses together. Hiram, who especially presided over this portion of the dwelling, put the two houses together so as to make the two kitchens into one large room.

Each house was a two-story frame, furnished with a high sloping roof with eaves projecting beyond the walls so as to form a covering for porches at the front and sides. On the first floor of each house there was a hall or vestibule, a parlor, dining-room, and kitchen, while on the second floor there were four good-sized

rooms. The two front rooms opened out on front and side porches, and the two back rooms on the side porches only. Since the two houses were placed end to end, and had been erected on the highest land, midway between the ocean and the lagoon, it was possible from the front porch of one of the houses to get a view of the ocean, and from the front porch of the other, a view of the lagoon.

As will be seen, there were plenty of bedrooms on the second floor. Captain Harding and Jack were assigned rooms in the front of the house facing the ocean, while Harold and Charley the two rooms immediately in the rear, but since Harold and Charley preferred sleeping together, they had fitted up the extra room as their sitting-room or study.

The two front rooms of the house facing the lagoon were built so as to form a single room, which was employed as a library and reading-room. In this were placed the books brought from the brig. Hiram occupied one of the other rooms, while the remaining rooms, as well as the high attics, were used for storing some of their extra goods.

The furnishing of the house, though by no means elaborate, was nevertheless comfortable. As already stated, the brig had in its cargo a fairly varied assortment of household goods, including bedsteads, mattresses, chairs, tables, bureaus, lounges, etc., while there was an excellent miscellaneous collection of small wares for the kitchen and dining-room. It is true that there were no carpets, but then the highly

colored blankets, of which they possessed a comparatively great store, made comfortable, if not esthetic floor coverings.

As soon as they could find time, they made hammocks from the netting twine. These, when hung on the porches, afforded pleasant resting-places on which to lie and read. All things considered, their house was a model of comfort; far preferable to the low-thatched huts employed by the inhabitants of most of the islands of the mid-Pacific.

The captain paid especial attention to the drinking-water. Selecting a spot about five hundred feet from the house, a well was dug eight feet in depth that soon filled with splendid pure and cool drinking-water. While they might have placed the well nearer the house yet, as the captain remarked, it was worth all the extra trouble its location made to avoid contamination by drainage from the house.

When the erection of the house at Jackson Harbor was completed they began, under Hiram's direction, the building of a boat intended for use on the lagoon. This took them about one week. The boat was very satisfactory and large enough to hold all five at one time.

In order to distinguish the two boats they called them by numbers. No. 23 being the name originally given to the boat in which Charley had been picked up, the boat in the lagoon was called "No, 13," since, as Charley said in a laughing tone, they might as well have a Jonah name for each of the boats. Of course,

most of my boy readers will understand the bad luck that is supposed by foolish people to be associated either with the skiddoo number 23, or with the unlucky or Friday number, 13.

They now began to settle down to their island life. The novelty of the new conditions of living was gradually wearing away. There was still, however, much to be done and each day brought its routine duties with it, yet they found plenty of leisure time, which they spent in reading as well as in talking with the captain.

But it must not be supposed they spent the greater portion of their time indoors. On the contrary, either in company with the captain or Hiram, or sometimes by themselves, the boys visited different parts of the island, generally bringing back with them some of its different food products. Now that the captain was satisfied the island had no other inhabitants he gave the boys full liberty to go anywhere in the boat on the lagoon. They were prohibited, however, from using boat No. 23 unless accompanied by Hiram or the captain, since off most parts of the coast there was danger from the breakers. Their experience in open boats led them always to keep plentiful supplies of food and fresh water on each of the boats.

Charley, who was a much stronger boy intellectually than Harold, had become greatly interested in the many wonderful properties possessed by the palm tree and its fruit, and had commenced a careful study of this tree. All three boys, especially Charley, had learned to climb the cocoanut palm, and to see the

rapidity with which both the younger boys could shin up a tree, throw down the cocoanuts, and shortly afterward return themselves, was a matter that never failed to lose its interest. Indeed, Charley soon learned to beat Harold at this, albeit Harold was an excellent climber.

One day, when they had all been out gathering cocoanuts and were ready to start back to Jackson House, they missed Charley. The captain going back to look for him found the lad sitting under a cocoanut palm with a cocoanut in his hands. He had removed the husk from the nut, and was looking so intently at the three black scars that are always found at one end of the nut that he failed to notice the captain's approach. Evidently something about the nut troubled the lad, for he was earnestly looking at it. That he had not reached a satisfactory conclusion could be told from the expression of his face. The problem was evidently a more difficult one than he was able to solve. Seeing this, the captain approaching, said:

"What troubles you, Charley? Let me know; probably I can help you."

"Thank you, captain. I would like to ask you a question I have been trying to answer myself, but have found it too hard for me."

"Let's hear it, Charley."

"Well, captain," replied Charley, "it's about these three black scars on the shell of the cocoanut. I know the use of the big scar; for, as you told us the other day, it is out of this opening a green bud or sprout

comes when the cocoanut begins to grow or sprout. What I have been trying to puzzle out are the uses for the two other scars. I believe you were about to tell us the uses of these openings the other day. I foolishly persuaded Harold not to ask about them, so you see I am punished."

"Then," said the captain inquiringly, "you think there must be some use for the two other scars."

"Why, certainly, captain," was the reply. "Natural objects have no useless parts, have they?"

"No, Charley," was the reply, "though it must be confessed that the uses of all the parts of some natural objects have not yet been discovered."

"Then, captain," said Charley, "can you tell me the use of the two extra scars on the end of the cocoanut?"

"Yes, Charley," was the reply. "When the cocoanut begins to grow, a sprout comes out of the larger of the openings, and growing upward produces the trunk of the cocoanut palm. At the same time two smaller sprouts come out of the two other scars. These, turning downward, form the roots of the tree."

"Thank you, captain," said Charley. "I'm glad to know this. There are so many things a fellow can't understand that it is comfortable to get a few of them out of the road."

That night, after supper, while they were sitting on the porch looking toward the ocean, the captain, turning to Jack and Harold, told them briefly the facts concerning the uses of the dark scars at the end of the cocoanut. He then said:

"I'm sure the growth of the cocoanut palm will interest you. When a ripe cocoanut is kept for a long time a white spongy substance forms inside the nut. This substance begins at the inside of the nut immediately opposite the largest of the three scars that are situated near the sharpest end of the shell, or the end where the stalk is attached to the husk. A change now takes place inside the nut, the fibrous spongy substance rapidly grows, absorbs the milky matter, and fills the entire inside. This change is preparatory to the germination or sprouting of the nut. A single white-colored bud or shoot soon breaks its way through the largest of the black scars or eyes in the shell, and after rising some inches unfolds pale green leaves. At the same time a thick white fiber bursts through each of the two smaller eyes of the nut and, turning in the opposite direction, grow downward into the ground. The sprout from the larger of the openings produces the trunk of the tree while the other sprouts form roots that attach it to the ground."

"What becomes of the shell, captain?" inquired Jack.

"During the changes on sprouting, the shell is softened, and both it and the husk decaying, serve to enrich the soil and thus aid the growth of the tree."

The three boys appeared to be so greatly interested in what the captain told them that he said:

"Suppose we agree that three days from now you will meet me after supper and tell me anything connected with either the fruit or any other parts of the

cocoanut palm, you can either observe for yourselves or can read about in the books of the library. We will then see which of you can relate the most curious facts. There is only one thing I must ask, and that is, that you don't attempt to take a short cut by getting Hiram to tell you anything."

The captain's suggestion created a generous rivalry among the boys, who not only diligently searched the books of the library, but also spent most of their time, of course alone, in careful observations of all parts of the cocoanut palm tree. During these observations the boys wandered over a large part of the island.

On the evening named by the captain, the boys came into the room laden with specimens from different parts of the tree. The specimen brought by Charley consisted of a large light wooden box carefully closed at the top. The box evidently contained something alive, for every now and then they could hear such vigorous blows struck against its sides that they confidently expected whatever it contained would soon break its way through.

"What have you there, Charley?" asked Jack, for although Charley had told Harold all about the contents of the box and, indeed, Harold had helped him put the thing into the box, both had kept the matter a secret from Jack.

"That's one of my facts," replied Charley. "You had better keep your hands off, since this particular fact is very much alive and might surprise you."

The captain now called on the boys, one after

the other, to exhibit some of the specimens they had collected, and at the same time asked them to explain the peculiarities the specimens were intended to illustrate.

Jack, who was called on first, exhibited something that greatly surprised both Harold and Charley, and even to some extent, the captain. It was a small piece of a strong fibrous material that had been woven in a marvelous manner. The fabric was of a white color, partially transparent, and was as fine in texture as a sheet of thin paper.

"From what part of the tree did you get that specimen, Jack?" inquired the captain.

"From this part," replied Jack, showing the stalk of one of the large leaves of the cocoanut palm together with a part of the trunk to which it had been attached. He then exhibited a species of natural cloth formed of intertwined fibrous materials that was attached to the bark under the bottom of the stalk, and extended half-way around the trunk, reaching several feet up the leaf, thus bracing or strengthening it, so as to prevent its being carried away by the wind. In the case of very young leaves this fibrous material is white, almost transparent, and very thin. As the leaf grows it becomes stronger and yellowish in color.

They examined with great interest this wonderful piece of cloth that had been spun in nature's loom by the intertwining of the delicate fibrous threads, the warp and weft of which consisted of fibers produced

in place during the growth of the tree and afterward held together by means of a still finer adhesive fibrous substance. Hiram, hearing what was going on, and being familiar with the cocoanut, had attended the meeting. Therefore, when Jack exhibited this wonderful piece of cloth, he remarked:

"Thet's wery pretty, Mr. Jack. In the Fiji Islands they make bags of this stuff, and in other islands they use it fer making jackets, coats, and shirts."

"Now, Harold," said the captain, "what have you to show us?"

Harold replied by handing the captain a piece of dry cocoanut meat he had prepared by exposing pieces of cocoanut meat to the sun until it had become dry and hard.

"What do you call it, Harold?" inquired Jack.

"It is dried cocoanut meat," said Harold, "and is known as copra."

"Oh, yes," replied Jack. "I was reading about copra the other day. What is it used for, Harold, do you know?"

"Of course, I do," was the reply, "haven't I been cramming up about it for the last three days from all the books I could find in the library?"

"Then, Harold," said the captain, seeing that Jack's remark had provoked the lad, "tell us what you have read."

Harold began by explaining that copra was the dried kernel or meat of the cocoanut. It is prepared in several ways. The best is by carefully drying the

entire nut, all that is necessary for this purpose being to build a house or shed in which to pile up the nuts. During this process the nuts must be kept dry and placed on boards, and not on the damp ground, since otherwise they would sprout. The husk is not removed, because in parts of Fiji and other densely populated islands there are species of cockroaches that will eat through the large scar at the end of the nuts for the purpose of drinking the milk. The air thus getting into the interior would cause the decay of the kernel. It takes about three months' drying in this way to convert the kernel into copra. When properly prepared, copra is as tough as leather, and will keep almost indefinitely without being affected by dampness or changes of climate. When the nuts are thoroughly dried, the husks are removed, the shell broken, and the kernel cut into pieces so as not to occupy too much bulk during transportation.

Another method of preparing copra consists in removing the husks from the nuts, breaking them in halves, emptying out the milk they contain, and exposing the pieces on a coral beach where they can be dried by the sun. If the weather is good, copra can be prepared by this process in three days. But if there is rain or heavy dew, unless the nuts are taken in or covered, they become mouldy and begin to rot, thus acquiring a very disagreeable odor.

"This," continued Harold, "is what makes my specimen smell so bad, but that's the way the book says copra is made, anyhow."

"Very good, Harold," said the captain. "Of course," he continued, "you understand that copra is used for the production of cocoanut oil, so valuable as a lubricator of machinery. Moreover, the refuse left after the oil is extracted forms an excellent cattle food. Besides this, a high grade of copra is sometimes employed in the preparation of food products containing grated cocoanut.

"And now, Charley," continued the captain, smiling and turning to the lad, "let's see the wonderful specimen you have in the box. I am afraid, whatever it is, that it is now in a very bad humor."

The captain had reason for this remark, for the animal, or whatever else it was, had been vigorously pounding against the sides of the box and, indeed, in one place it had already partially broken through.

Rompey, who attended the meeting—for the animal was always found with his young masters when not prohibited from doing so—evidently regarded the occupant of Charley's box as something to be dreaded. He kept up a continuous growling, and when Charley began to open the lid apparently prepared himself to protect his young masters if anything happened.

"Hold him back, Harold," said Charley. "He'll get hurt if he comes too near."

When Charley opened the box they saw a specimen of a large landcrab, of a species exceedingly fond of cocoanuts. It was a vigorous animal, possessing mandibles or claws large enough to break a man's arm if permitted to strike a full blow, and quite powerful

enough to break open the shell of a cocoanut in order to get at the meat. Charley had ingeniously rendered the animal harmless by tying bits of thick cord around its body and securing the ends by nails driven into the bottom of the box.

"I caught this crab," said Charley, "eating a cocoanut under a tree near Boulder Beach. He appeared to be enjoying the cocoanut very much."

"Yes," said Hiram, "thet feller eats clean food, and makes splendid eating hisself. Ef ye don't wish to take him to bed with ye to-night, suppose ye give him to me and I'll sarve him up to-morrow at the breakfast table."

"You can have him, Hiram," said Charley laughing.

"Uncle Arthur," said Harold, "the books say there are cockroaches in the Fiji Islands. I've been looking around for a cockroach for the last two days to exhibit him with a piece of copra, but I'm sorry to say that I could not find one."

"Sorry!" exclaimed Jack indignantly. "You ought to be glad."

"I don't think you will find cockroaches on Harding Island, Harold," said the captain. "They, as well as rats, are brought to such islands as the Fijis by the ships. Making their way to the land during the shipping of the cargo, the animals rapidly multiply and overrun the island. It is because ships do not visit Harding Island that we are indebted to the absence of these disagreeable animals."

CHAPTER XI

The Captain's Conundrum. How Coral Islands are Formed

Ever since the captain had given Jack and Charley the conundrum as to how the central part of the lagoon of Harding Island could once have been the highest point of land on an ordinary island, a generous rivalry had existed between them. Naturally each tried his best to be the first to guess the conundrum, but so far from there being the slightest bad feeling, each was always ready to aid the other in his efforts to solve the problem. Indeed, they often freely discussed the difficulties both had experienced.

When they learned that the mass of solid limestone on which the coral island rested was undoubtedly several thousand feet thick, and were then almost immediately afterward informed that the coral polyps could not live in water deeper than about a hundred and fifty feet, they were very greatly puzzled to understand how such apparently contrary things could be possible.

One day, while all three boys were on the Harding lagoon in boat No. 13, Charley, turning to Jack, said:

"How are you getting on with the captain's conundrum, Jack?"

"Not so well as I would like, Charley," was the reply. "If I remained on the lower parts of the island near Jackson Harbor I might guess the conundrum, but as soon as I go to the higher parts in the neighborhood of Parker Cliffs matters look so different that I am forced to believe the conclusions I have reached are wrong. How are you getting along?" he continued.

"I am doing splendidly, thank you," replied Charley. "You remember what I said to you the other day about studying the matter entirely from the gradual sinking of the island and leaving out the matter of elevation. In this way I think I have guessed the conundrum. If Harding Island was once an ordinary island with its highest land over the middle of what is now the lagoon, and the land sank no faster than the waves formed a reef off its shores, then I think our island might eventually have been formed. There are, however, many things about the problem that I cannot understand."

Jack was greatly surprised at Charley's remarks. Grasping him by the hand he shook it heartily and said:

"Charley, I congratulate you. I am sure you have solved the captain's conundrum. You have fairly beaten me. Suppose we go to the captain, tell him your answer, and ask him to explain the things you don't understand."

"Yes," said Harold, "let's go. I would like to hear about this thing myself."

Rowing the boat to its landing on the shore of the lagoon opposite Jackson Harbor, they went to Jackson House where they found the captain in the reading room facing the lagoon.

The captain was surprised at their coming back so soon. It was yet early in the afternoon with good clear weather, and this almost always led the boys, when on the lagoon, to remain until near supper-time. He therefore exclaimed:

"What's the matter, boys? What brings you back so soon? Has anything happened?"

"There's nothing happened," said Jack, "except that we came to say that we think Charley has guessed your conundrum about the formation of a coral island, and wish to know whether he is right."

"I'm glad to hear that, Charley," said the captain smiling. "Let me see, you were to explain how, although coral animals can only live in comparatively shallow water, the deepest portion of the water in the lagoon must have been the highest point of land of an ordinary island. What's the answer, Charley?"

"Because," said Charley, "Harding Island was once an ordinary island with its highest points above the center of the present lagoon. The coral animals began to grow in the shallow waters at different points near the shores. Their dead bodies, broken into fragments or ground into sand, were piled up by the waves, and being cemented by the waters into solid limestone, gradually formed the reef. If the island sank no more rapidly than the animals furnished materials for the

reef, the growth of the island could continue until the reef completely surrounded the island. At last, therefore, the highest part of the old island was far below the line of the water in the lagoon."

"Splendid, Charley," said the captain. "I did not expect either of you to solve the conundrum. The formation of a coral island is a matter that has puzzled the ablest scientific men. Your solution is excellent as far as it goes. I was quite sure when I stated the conundrum that you would have difficulty in solving it in the case of Harding Island, since the elevation of the island at Parker Cliffs and its much lower height in the rest of the island must have given you considerable difficulty."

"That is just what it did," said Charley. "It was only after talking over these difficulties with Jack that I determined to leave out of consideration all parts of the island that showed no signs of gradual sinking. In this manner I have reached what you tell me is the correct answer to the conundrum."

"Captain," said Jack, "won't you explain now just how, as you understand it, Harding Island was formed?"

"Certainly, Jack," was the reply.

The boys settled themselves down comfortably around the captain who said:

"I think you will understand me better if you ask questions while I'm talking. Don't hesitate to break in. I'll try to make clear to you anything you don't understand."

"We'll ask questions all right, captain," said the boys laughing.

"I will begin," said the captain, "by saying that Harding Island is a completed form of coral island, that as Charley correctly says, has been built by the waves around a slowly sinking island. This sinking has gone on for thousands upon thousands of years. Had we been able to see the island during different stages of its formation, we should have seen very different appearances from those existing at the present time. After I have explained to you the manner in which it is now generally believed coral islands are formed, I intend asking you to describe to me some of the different appearances Harding Island would have presented at different stages of its formation."

"We'll not forget that, captain," said Jack. "Will we, Charley?"

"Not much," was the reply.

"Why are you leaving me out?" inquired Harold indignantly. "We'll see whether I can't answer the question as well as either of you."

"All right, Harold," said the captain good-naturedly, "I'll promise to give you the first chance.

"It was the great naturalist, Charles Darwin," continued the captain, "who first pointed out the manner in which coral islands were formed. His explanation is based on what he saw during a voyage around the world in 1832-1836, as naturalist to the exploring expedition in the Beagle, under the command of Captain FitzRoy, of the English Royal Navy.

"Before Darwin's time erroneous ideas were held concerning the formation of coral islands. Since fragments of coral rock were brought to the surface by the dredges from almost all depths, it was assumed that the coral animals could live even in the deepest water, and that in the warmer parts of the ocean they were actively at work over the entire bed of the ocean building coral rocks. It was then believed that the coral polyp actually builds the coral reef by taking limestone from the water and depositing it piece after piece until the solid limestone base on which all coral islands rest was produced.

"The early navigators had observed several types of coral reefs in different parts of the ocean. In some places there was a narrow strip or reef of coral lying in the shape of a fringe near the shores of an ordinary island. This reef was separated from the island by a narrow channel of water and was known as a fringing reef.

"Around other islands there were found broader coral reefs, separated from the island by a greater breadth of water. The channel separating the reef from the island almost always consisted of very deep water, and since it formed a barrier which protected the island from the breakers, it was known as a barrier reef."

"I have seen such reefs, captain," said Charley, "off the eastern shores of Australia."

"Yes, Charley," said the captain, "there is a barrier reef off the eastern coast of Australia that is fully one

thousand miles in length. As there are breaks in this reef, and the water between the reef and the mainland is quite deep, there are thus formed magnificent harbors large enough to shelter the combined navies of the world."

"Does the barrier reef finally extend entirely around the island?" inquired Jack.

"Yes," said the captain, "and when it does it forms another variety of coral reef known as the encircling reef; that is, a ring-shaped mass of coral extending around an ordinary island which lies near its center."

"That's the highest point of land of the old Harding Island before its top sank into the lagoon," whispered Charley to Jack.

"There is still another form of coral reef," continued the captain, "consisting of a ringlike reef encircling a lagoon or lake. This is known as an atoll.

"All these different forms of coral reefs," continued the captain, "had been observed long before it was discovered that the coral animals were unable to live in the ocean except in water not deeper than twenty-five fathoms, or a hundred and twenty-five feet."

As the captain was about to proceed, Harold interrupted, asking his uncle if it were known why the coral polyp could not live in deep water.

"Yes, Harold," was the reply. "It is generally believed that the animals cannot live at greater depths for want of sufficient light, for they need an abundance of light for vigorous growth. Then too, the coral polyps,

at least such species as form reefs, cannot live in water whose temperature during the coldest winter months is lower than 68° F.

"This not only prevents coral formations from occurring except in the warmer waters of the ocean, but is also probably what prevents the animal from living in greater depths than one hundred and twenty-five feet, for below this depth, even in tropical waters, the temperature of the water is at times apt to become colder than 68° F.

"But," continued the captain, "there are other conditions necessary to permit the vigorous growth of the coral polyps from which reefs are formed. Since the polyps require various saline substances, especially salts of lime, the animals cannot live off portions of the shore reef that lie almost opposite the mouth of a large river, since here waters of the ocean are too much diluted with the fresh water of the river to supply the necessary lime. Then too, river water generally brings mud with it. This not only renders the water impure, but also deposits mud-banks or flats on which the animals cannot live."

"Is that the cause of breaks in the reef?" inquired Jack.

"Yes, Jack, that's the general cause."

"And is that what keeps the coral reef from growing closer to the shore?" asked Charley.

"Yes," was the reply. "Now," continued the captain, "when it was discovered that the coral animals could not begin growing where the water was over

one hundred and twenty-five feet deep, it was, of course, necessary to modify the views held concerning the formation of coral islands. As far as the fringing reef was concerned there was no difficulty. Of course, the coral animals could begin growing on the bottom off the coast of any island where the necessary conditions of depth, temperature, and freedom from sediment existed. It was not, however, so easy to explain the formation of barrier reefs, encircling reefs, or atolls; for, as was then known, the bottom of the ocean in the neighborhood of any of these last three forms of coral reefs was far beyond the depth at which the animal could live.

"Numerous theories, some of which were very foolish, were proposed to explain the presence of shallow portions of the ocean, so shaped as to permit the formation of barrier reefs, encircling reefs, or atolls. It would take me too long to describe these theories, nor is it worth my while to do so, since nobody to-day believes them. It may, however, interest you to know that at one time it was suggested that there exists on the bed of the ocean the rims or edges of the craters of extinct volcanoes, no farther below the surface than a hundred and twenty-five feet; that the coral animals began living on the edges of these craters, and being unable to extend or build over the deep waters of the craters or of the deep ocean beyond the craters, the reef at last acquired the form of the atoll. I need hardly tell you that such a theory would seem to be highly improbable, not only by reason of the im-

mense number of coral islands that are found in different parts of the waters of the tropics, but also because of the great size such craters should possess; for there are many atolls in parts of the Pacific, the length of whose lagoons is from twenty to fifty miles across."

"That's so," said Charley; "in the case of Harding Island, the crater would have been sixteen miles across. That would certainly be a very big crater."

"Captain," said Jack, "won't you please let us have Darwin's explanation of the circular shape of the reef of the atoll?"

"Yes, Jack," replied the captain, "I'm coming to Darwin's theory now. Let us suppose an island, say about the same shape and form as the atoll that forms Harding Island, only a little smaller, was situated in a portion of the Pacific that was slowly sinking. Let us also suppose that a narrow ribbon or reef of coral, in other words, a fringing reef, began to be formed by the action of the waves a short distance off the coast. Now, provided the corals furnished the materials for the waves to build the reef upward as fast as the sinking of the island carried the reef downward, such a reef would continue to grow indefinitely. Of course, if the rate of sinking became too rapid the animals would die as soon as the waters became too deep, while if it was not sinking rapidly enough the animals would die on their first exposure, during low tide, to the heat of the tropical sun.

"But let us suppose that the upward growth of the

reef as formed by the waves, is exactly equal to the downward motion caused by the sinking of the island. Then, of course, as the island sinks the distance between the reef and the shore increases, the reef meanwhile grows slightly broader, thus forming the barrier reef. The barrier reef would then extend farther around the island, and at last would more or less completely surround it, thus forming the encircling reef. The island would then consist of a coral reef encircling an ordinary island, for now only the highest points of the land of the original island would remain above the waters. Finally, these would disappear and we would have a more or less circular coral reef surrounding a clear space in the ocean.

"Now, Harold," continued the captain, "can you tell me what might have been seen at different periods of time during the formation of Harding Island?"

"Yes, uncle," was the reply. "When the reefs first began to form there would have been seen an island about the size of the Harding lagoon with a fringing reef near parts of its shores. Then, many thousands of years afterward, the same island might have been seen with a longer and broader barrier reef. But it is now smaller, and the distance between the reef and its coast much greater. At a later period, perhaps many thousands of years afterward, the original island has almost disappeared, and can be seen surrounded by an encircling reef. Finally, there would be seen what we see now—a coral reef surrounding the lagoon."

"Capital, Harold," said the captain. "I think you understand that very well."

"I believe I do, uncle," replied Harold, much pleased with the captain's praise.

The boys were all greatly impressed with the beauty of Darwin's theory.

"Then, according to Darwin, captain," said Jack, "instead of coral islands marking as the poets declare the site of so much land gained from the ocean, they are only the tombstones of sunken islands, on which one can read this inscription:

"'Here lies a sunken island. This (the shape of the reef) was the shape of its coast, and this (an opening through the reef) was the part of the coast through which a large river emptied.'"

"Hello, Jack," said Charley, "you're getting quite poetic. Let me put it another way, captain. Suppose I attempt to be dramatic and describe the four different scenes at different times around Harding Island:

"Scene I. Harding Island. Size and shape about that of the present lagoon. Small fringing reefs near the coast.

"Scene II. Many thousands of years later. Harding Island still in sight, but smaller. Barrier reef seen off the coast.

"Scene III. Another few thousand years later. A little bit of Harding Island visible. The higher portions seen above the middle of the lagoon as four small islands, each surrounded by an encircling reef.

"Scene IV. Another few thousand years later. Or,

perhaps, many thousands," he said laughing, "Harding Island entirely gone. No land at all. Only a lagoon left surrounded by a coral reef and its lagoon islands. I say, captain," he continued, "is the completed coral island called an atoll because there is no land, at all, left of the original island?"

When Charley got off this awful joke, Jack and Harold began punching him good-naturedly, and the captain laughingly said:

"I believe, Charley, that the word atoll is used in the language of the Maldive Islanders. I don't know just what it means."

The boys were greatly pleased at what they had learned concerning coral islands.

"It's very strange, uncle," said Harold, "that I have been able to find no book on coral islands in the library. I looked several times but could not see them, although I think I remember several such books that were in the library on the brig, and I think I remember seeing them in our library here."

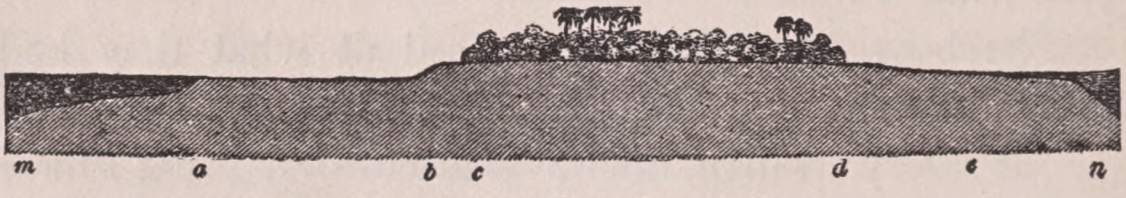
"That's correct, Harold," said the captain smiling. "Let me confess that I've hid all of these books. I wished Charley and Jack to try to puzzle out this matter independently of books." He then brought out a number of books on coral islands, especially Dana's excellent treatise on "Corals and Coral Islands."

"Look at this picture," he said. "It shows a section of a coral island through the land from the ocean to the lagoon. As you can see, the island consists of the following parts:

" 1. The shore platform, from 'a' to 'b.' This lies between the lower part of the sand beach, and the deeper part of the ocean. It is covered, as you know, by fairly shallow water at high tide. The greater part is bare at low tide, with here and there places covered by a few inches, and sometimes by a foot, of water.

" 2. The beach. This consists of coral pebbles, sand, and worn and bleached shells, the bones of fishes, etc.

" 3. The emerged land. This extends beyond the beach, between 'c' and 'd.' It consists of portions of the reef that have been thrown above the highest point



Section of the Rim of an Atoll

of the beach by the waves, and have in places been made still higher by sand being blown over them by the winds. Here, the soil is formed mainly from coral sand, and in it the luxuriant vegetation of the island grows.

" 4. The shore of the lagoon. This also consists of a beach and submerged platform, that in the case of an island without any connection with the ocean remain covered with water, but where there is a free communication with the ocean by breaks in the reef, is more or less uncovered or dry at low tide. Beyond this platform the waters of the lagoon rapidly deepen.

" 5. The lagoon, a clear body of water partially or completely surrounded by the island reef."

"But, captain," said Jack, "how about the higher portion of Harding Island in the neighborhood of Parker Cliffs?"

"Yes, how about this part?" repeated Charley.

"I think this portion of the island," said the captain, "is higher than the rest because it has been suddenly elevated, probably by an earthquake. This is not unusual in some parts of the Pacific. But what is odd about Harding Island is that only one portion of the island has been elevated. For this reason, I believe, a careful examination of the reef would show two places where the lower part of the reef has been fissured or broken away from the higher part during this sudden elevation."

"We must look for those cracks, boys," said Jack, turning to his companions.

"Captain," inquired Charley, "I suppose, of course, the four islands in the lagoon of Harding Island were formed in the same manner?"

"We will make an excursion to-morrow to these islands and see what help they will give us in answering this question."

CHAPTER XII

The Islands of the Harding Lagoon

They were off early next morning in boat No. 13 to visit the islands in the lagoon. As already stated, this visit was to permit the boys to draw their own conclusions as to the origin of these islands. Of course, the captain might readily have directly explained their origin, but he knew by experience that information based on personal reasoning and observation is far more complete than that acquired by mere explanations. Since they expected to be absent an entire day, and, indeed, if necessary were ready to spend the night on one of the islands, they took some food and a few cooking utensils. Hiram accompanied them, and even Rompey and Satan were not left behind.

As they intended to make soundings, Hiram had brought a sounding-line, and the boys had their fishing-lines which, indeed, were kept in the boat as a regular part of its equipment.

Since the discovery of the underground connection or opening between the ocean outside Harding Island and the main lagoon, and since it was evident from the size and the depth of the underground passage into which Harold had fallen while in the limestone grotto, that the flow of water through it was fairly great, they expected to find a tide in the main lagoon. Indeed,

on looking for such a tide they discovered that a small difference of level existed between the waters of Harding Lagoon and the ocean.

As the captain pointed out, if the underground passage was the only connection between the ocean and the lagoon, with the trifling exception of the low parts of the reef near Jackson Harbor where, at high tide, the waves occasionally dashed over the beach into the lagoon, there was apparently no other connection, then the velocity with which the water must pour through the channel between the ocean and the lagoon must result in a rapid wearing away or enlargement of the opening.

"Do you think it possible," inquired Jack of the captain, "that the time may come when this undermining of the cliffs will be followed by their caving in?"

"Such a thing is not at all improbable, Jack," replied the captain. "As to just when such an event will occur will of course depend entirely on the size of the subterranean passageway as well as the extent to which this portion of the reef has also been honeycombed by the rain-water. By our exploration of the grotto and cave immediately above the passageway, we know the honeycombing of a portion of the mass of limestone has been considerable, so that the time of their caving in may not be distant."

"But," suggested Charley, "suppose an earthquake, such as I understood you to say probably caused the elevation of this portion of the island, should again occur?"

"In such a case," said the captain, "I believe a caving in would be almost certain."

"Harding Island would then be provided with a magnificent harbor where large vessels could enter," said Jack. "This would greatly increase its value, would it not?"

"Yes," said the captain; "but it would at the same time probably result in the visiting of the island by the inhabitants of the neighboring islands of this portion of the Pacific, and in their eventually settling on it."

"Would that be good for us, Uncle Arthur," inquired Harold, "or would it be bad?"

"That would depend on who the visitors were," was the reply. "If cannibals, I fear it would be bad for you; for, being both young and tender, I think it likely you would be the first one of us they would eat."

"You needn't try to frighten me that way, uncle," exclaimed Harold indignantly, and yet at the same time there was some little anxiety in the tone of his voice, indicating that he hoped it would be a long time before the caving-in occurred. Indeed, this was indicated by a remark he made after apparently thinking for a few moments of what the captain had told him, for he said: "Then, uncle, I hope Parker Cliffs do not fall in."

"Never mind, Harold," said Jack in a jollying tone, "even if they don't fall in, some of the cannibals may visit the island taking the risk of landing on it, breakers or no breakers, and harbor or no harbor, so you have a chance of being eaten after all."

As has already been stated, the four islands of the Harding Lagoon extended from a point near the eastern shore from the southeast to the northwest in a nearly straight line midway between the northern and southern shores. The two largest islands, the Twins, were nearer the east, while the smaller ones, Rompey and Satan, were west of them.

Since, as the captain suggested, there would probably be more to see on the larger islands, they directed the boat toward the easternmost of the Twins, or Twin Island No. 1.

"Captain," said Jack, "suppose we call the easternmost of the Kids, Kid Island No. 1, and the westernmost, Kid Island No. 2"; and then turning to the boys, he said in a bantering tone: "Which of you will be Kid No. 1, Harold or Charley?"

"Wait until Harold and I get you alone, Jack," whispered Charley good-naturedly. "We'll settle that question then."

As the boat proceeded slowly along the edge of the shore platform of the lagoon of Harding Island they could see here and there growths of different species of coral animals. These were especially interesting to them now they knew something about the formation of coral islands. In portions of the shallow waters near the shore where they could see that the bottom was covered with sand, there was an absence of these animals.

While proceeding toward the Twin Islands they made a number of soundings, and found the bottom

was not reached until the line had been run out to from twenty-five to thirty-five fathoms, or from one hundred and fifty to two hundred and ten feet. It did not appear from these, as well as from subsequent soundings, that the bottom of the lagoon was very irregular. The depth was nearly the same in all places at several hundred feet from the shore; namely, thirty-five fathoms, or two hundred and ten feet.

When they reached the easternmost end of Twin Island No. 1, instead of landing, the captain suggested that they should take the boat to that part of Parker Cliffs near where they supposed the passageway from the ocean entered the lagoon.

"We are in no hurry," he said. "While here we might as well more carefully examine this part of the cliffs." Then, turning to the boys, he remarked: "If you are ever in this part of the lagoon without Hiram or myself, never go near the shore in the neighborhood of the opening. The current from the lagoon to the ocean might be sufficiently strong to suck you in. As the tide is now at its lowest point, I think we can safely take the boat along the shore. We may in this way be able to locate the opening, and thus know the exact part of the shore that must be avoided when the tide is flowing out."

They rowed the boat toward a portion of the high limestone rocks around Parker Cliffs, about half a mile northwest of Hiram Harbor. They had never before been in this portion of the shores of the lagoon. The day they had discovered the underground passage they

had afterward descended to the shores of the lagoon at a point one mile farther to the north. As the boat approached the shore they could see that, at this part of the coast, there were bluffs or cliffs resembling those already examined on the ocean side. These cliffs had been eaten away by the rain-water as it ran into the lagoon in a manner similar to the cliffs on the other side. Moreover, the groovings apparently extended several miles to the northwest. Taking the boat along the bluffs they at last discovered an opening through which the water of the lagoon was beginning slowly to flow through the cliffs toward the ocean. The top of the opening was only a few feet above the level of the water.

"I need not tell you," said the captain, "that it would be dangerous if the boat were sucked into this opening. Since, however, the current is now weak, we will take a sounding here. If, as I expect to find, the water is deep, it will enable us roughly to estimate the extent of the channel between the lagoon and the ocean."

To their great surprise the lagoon at this point showed a depth of one hundred fathoms or six hundred feet. Greatly surprised at the extent of the opening, the captain, turning to Hiram, said:

"I think we had better get quickly out of this neighborhood, Hiram."

"I reckon yer right," replied Hiram, "onless ye want to take the boat into that 'ere opening."

"Not to-day," replied the captain.

So they rapidly rowed the boat away from the opening.

As the boat proceeded toward the easternmost of the Twin Islands, or Twin Island No. 1, they could see the waters of the Harding Lagoon, ruffled by the south-eastern winds, break in waves against a low piece of beach, the only part of the island that was not covered with dense vegetation.

"The high tide must flow over that part of Twin Island No. 1, into its lagoon," remarked the captain.

"Boys," he continued, when the boat reached a point midway between the two twin islands, and had landed it on the western shore of Twin Island No. 1, "I wish you to make it a rule never to pass the eastern shores of Twin Island No. 1 when the tide is at the ebb, or flowing toward the ocean. At the flood tide, when the water is flowing in from the ocean, there will be no danger."

Anchoring the boat on the western coast where the waves or breakers were almost entirely absent, they were soon on the island. The island had a lagoon at its center, and was a curious reproduction in miniature of Harding Island. It had a reef encircling a lagoon of the same general shape as the Harding Lagoon. It was a wooded island and, except toward the east, had a luxuriant vegetation of cocoanut palms as well as the other characteristic vegetation of the larger island. It even showed a miniature shore platform both on the outside of the reef in the main lagoon as well as inside it in its own lagoon. Besides this, there were beaches

of the same white coral sand on both the outside and the inside of the encircling reef. Walking directly across the island to its lagoon, they observed that the waters of the lagoon closely resembled in depth of color those of the main lagoon.

"The lagoon of this island," said the captain, "is connected with the waters of the main lagoon. Yes, it is as I thought," he continued, after having carefully scanned the waters of its lagoon with his glasses. "See," he said to Hiram, handing him the glasses, "there is a low part of the reef that is now quite dry. At high tide there should be from three to four inches of water flowing into the lagoon."

The break referred to by the captain was situated on the easternmost end of the island, so that the waters which entered its lagoon would consist for a large part of the waters brought by the high tide from the outside ocean through the opening in Parker Cliffs into the Harding Lagoon.

"The saltness of the waters of this little lagoon," said the captain, "should closely resemble those of the outer ocean. I think that we shall find here a fairly vigorous growth of coral polyps."

The correctness of the captain's opinion was shown by the numerous coral zoophytes they found growing in the waters near the shores.

It was a warm day, and the waters were tempting to the boys so, obtaining permission from the captain, they were soon having a splendid swim. Indeed, as will be subsequently related, the boys found in another part

of this lagoon a magnificent place for a swimming-pool.

An abundance of precious coral, the name given to the beautiful pink variety of coral that is highly esteemed for making ornaments for babies, was found growing in various parts of the somewhat deeper waters of the lagoon. In the still deeper waters, at a greater distance from the shore, what closely resembled oysters were seen growing.

"These are probably the species of oysters in which precious pearls are often found. We'll come back here before long and try to get some of them. I am sure both Harold and Charley would like to take a lot of splendid pearls home for their mothers."

"If we ever get home," replied Harold sorrowfully.

"Oh, we'll get home somehow or other," said Charley.

Twin Island No. 2 was next visited. Here the vegetation consisted of cocoanut palms and other vegetable products like those of Harding Island and Twin Island No. 1. Walking across the island to its lagoon, they at once noticed a marked difference in the appearance of its waters, which were of a blue color that was equal in intensity to the waters they had seen in the Kuro Sivo, or the Black Water of the Japan Current. Indeed, in places, the waters were of a reddish or copper color.

Remembering the captain had told them, as has been related in "Five Months on a Derelict," that the dark blue color of the waters of the Japan Current, as well as that of the Gulf Stream and other deep por-

tions of the ocean, is due to the increased saltness of the waters, Jack remarked:

"We'll probably find no connection between the waters of this lagoon and those of the main lagoon. The color of the waters means very salt water, don't it?"

"That's right, Jack," said the captain, who had been examining the shores of the lagoon with his glasses, "there's no break. The waters are of a deep blue, and have apparently for a long time been increasing in density by evaporation. Indeed, were it not for the heavy rains that fall in this part of the world there would probably have been produced by this time a great bed of rock salt."

"Captain," said Charley, "there are salt crystals on some portions of the shore," pointing to white crystals that shone brightly when the sun fell on them.

"I wonder how much denser the waters of this lagoon are than those of the ocean," said Jack.

"Did I not see you put several birds' eggs in the boat as we were leaving this morning, Jack?" said the captain.

"Yes, sir," was the reply. "Yesterday, before supper-time, Hiram asked me to get some eggs for our lunch to-day. Do you want them, captain?"

"Yes, go bring me one, please," was the reply.

Jack soon returned with one of the eggs, which he handed to the captain. The boys looked closely at what the captain would do. They knew he was clever with his experiments, but couldn't imagine how he might

answer Jack's question as to the density of the salt water of the lagoon by the use of a bird's egg.

Seeing that they were curious about the matter, the captain turned to Jack and said:

"Do you know, Jack, whether this egg would sink in ocean water?"

"I am not sure," was the reply.

"But I am," said Charley. "The other day as Harold and I were larking on the edge of the plateau facing the ocean, Harold, who had a stone in his hand, threw it in the ocean and, turning to me, said: 'Charley, I don't believe you can throw that far.' I looked around for a stone but couldn't find one, but I had an egg in my pocket, and I shied it into the water. I noticed it didn't sink, but floated with just a little of its surface above the water."

"Thus proving," said Jack, "what a poor throw you must have made, Charley, else how could you have seen in so far from the land."

"Because," said Charley laughing, "the tide was coming in and brought the egg close to the shore from the mile or so to which I had thrown it."

"I'm glad, Charley, you noticed the egg barely floated in the ocean water," said the captain. "Now, boys," he added, "as you all probably know, an egg will sink in fresh water, and Charley has told you it will float in the ocean with just a little of its surface above the water. If, then, the waters of this lagoon are much salter than those of the ocean, the egg will float with more of its surface out of the water. I'll

throw the egg into the water here," continued the captain, "and by observing how far it floats out of the water we can form some idea how much denser the water of the lagoon is than ocean water."

When thrown into the lagoon, the egg floated with a fairly large portion above the level of the water.

"Did you invent that, Uncle Arthur?" asked Harold.

"No, Harold," was the reply, "it is the principle of a device called the hydrometer, a well-known instrument for determining the density of liquids."

"Captain," inquired Charley smiling, "is there any objection to Jack, Harold, and I becoming human hydrometers?"

"Do you mean, Charley," said the captain laughing, "whether I object to you and Harold taking a swim in the salty waters of this lagoon?"

"Yes," replied Charley. "I have read that in the Dead Sea the water is so salt it is difficult to sink in it, even though one tries to do so. I understand its waters are eight times salter than the waters of the ocean."

The captain not objecting, the boys were soon undressed and taking a bath in the salt water. It was, indeed, wonderfully buoyant. The boys were quite at home in the water, so stretching themselves on their backs floated about on it like logs. They also made several attempts at swimming, but were surprised how far the head and shoulders remained above the level of the water, and when they tried to sink in the water they found it almost impossible.

Determined that he would get below the surface, Charley climbed on Jack's shoulders, and making a splendid dive, completely disappeared, but the rapidity with which he was shortly afterward shot upward was so great that his body was nearly half out of the water.

Pleased with his success, Charley cried out to Harold:

"Harold, it's——" but sank again so rapidly that before completing the word "great" he was about to utter, his head was carried below the surface while his mouth was open.

Charley came up spluttering and spitting the water out of his mouth.

"It's what, Charley?" inquired Jack laughing.

"Horribly disgusting," was the remark. "Try it for yourself, Jack," he replied and, taking advantage of Jack's mouth being wide open, while guffawing at the expression of Charley's countenance, he threw a double handful of water squarely into it.

"Serves me right," said Jack good-naturedly, spitting it out. "Ugh! what a horrible taste! I guess I'll get out. I've had a long-enough swim."

The captain and Hiram had been amused spectators of the boys' novel swim. By the time they were dressed, Hiram had good-naturedly gone to the boat and brought fresh water, so they had an opportunity of rinsing out their mouths.

"By the way, boys," said the captain, "water as salt as this acts as a tonic, and is excellent in case of rheumatism. If, therefore, any of you should ever be so

unfortunate as to become rheumatic, which is not improbable in the low land of a coral island, remember that a bath in this lagoon may be of much value."

There yet remained the two smaller islands, or islets, as they are sometimes called; namely, "Rompey" and "Satan," or as Jack called them, "The Kids." "Kid Island No. 1," or "Rompey Island," as already stated lay immediately west of "Twin Island No. 1," and was very much smaller than either of the twins.

On landing and crossing this island toward its center they found that its lagoon had almost completely disappeared by evaporation; for the water was shallow and occupied only a small portion near the middle, while between the water and the shore the bottom was covered with soft mud. In the immediate neighborhood of the shores were collections of crystals of the salty substances deposited on the evaporation of the water.

The waters of the lagoon had completely disappeared on Kid Island No. 2 or Satan Island, which they next visited. In other words, it was a lagoonless island. Here the bed of the lagoon had dried up completely, and consisted of a mass of salty substances covered in places with beds of coral sand.

Great numbers of birds had visited this island for the purpose of breeding, laying their eggs in the sand. It was breeding-time, and thousands of them had collected in separate flocks on different parts of the bed of the old lagoon. There were also large deposits of guano which, as the captain explained, was a valuable fertilizer.

"Some of these days," said the captain, "when we start our vegetable and flower garden, we may find it worth while to enrich the soil by mixing it with guano, which is splendid for that purpose."'

It must not be forgotten that the object of their visit to the smaller islands was, if possible, to determine their origin. Now both the Twin Islands had practically the same formation as Harding Island. There was an encircling reef, a lagoon, and a shore platform in both lagoons. There was, moreover, a beach on both the outside and inside of the island. The same things too were found on the Kid Islands, only by reason of the small size of the lagoons, their waters had in one instance almost, and in the other completely, disappeared. It seemed, therefore, almost certain, from what they had seen, that the formation of each was similar to that of Harding Island itself. That the highest land in the original island, consisting of a range of elevations extending from the southeast to the northwest, had not disappeared until fringing reefs, barrier reefs, and encircling reefs had formed around them; so that when the highest tops of the old island disappeared, the coral reefs continuing to grow, each enclosed a body of water like that of the parent island.

As the captain pointed out, these lagoon islets—a general name given to small islets formed inside a lagoon—were not uncommon in certain parts of the Pacific.

"They are," said the captain, "what Dana calls 'gems within gems.'"

CHAPTER XIII

The Swimming-pool

The boys had so greatly enjoyed their swim in the lagoon of Twin Island No. 1 that they frequently referred to it both while on their way back to Jackson House as well as at supper. Indeed, they were so desirous of taking another swim at the earliest possible moment, that they had obtained the captain's permission to spend the remainder of the next day on this island as soon as they had finished the day's work. Knowing that people are happy only when fairly busy, the captain had assigned daily duties not only to Hiram and himself, but also to the boys. For example, it was the boys' work to bring water from the spring to Hiram for cooking, to see that both boats were kept supplied with an abundance of fresh water and food. They were also charged with keeping the house clean; making the beds; and giving Hiram such help when preparing food for cooking, as he might wish. Then, again, it was the boys who gathered the cocoanuts, collected fresh birds' eggs, and caught fish for the table.

"Won't you and Hiram go with us, captain?" asked Jack at the supper table, when the captain had given them permission to have the day to themselves.

"No," was the reply, "we both have some matters that must be attended to."

"If you would like us to help you, captain?" inquired Jack, "we can put the swim off for another day."

"No," was the reply. "There is no reason why you should not spend the balance of to-morrow on Twin Island No. 1 and have a good time. If you discover anything new either in the way of plants or animals, bring specimens with you if possible."

It was not yet ten o'clock next day when, having finished their work, they pushed the boat from the landing and started for the island, with Jack as leader of the party. The captain had thoroughly instilled in the minds of the boys the principle that in any expedition or excursion when either he or Hiram was not with them, they must select one of their number as leader. As he explained to them, this was always done among men, and there was no reason why boys should not adopt the same plan. That, when they had selected their leader, since he would be held responsible for the safety of the party, it was necessary that he should be promptly obeyed in all things.

When the three boys were together, Jack was naturally selected as their leader. He was much older than either of the others and, therefore, more reliable. Although fond of chaffing, he was much liked by both the younger boys.

Of course, there was a difference between the captain and Jack as a leader. Although the boys promptly obeyed Jack in all necessary orders, yet they did not hesitate to jolly him and have such times with him as

boys generally have when they are out for fun. Taking everything into consideration, therefore, they got along very pleasantly and agreeably with Jack as their leader.

"Boys," said Jack, as they were nearing the island, "I suppose we'll get at least two good swims to-day."

"And a sun-bath," suggested Harold.

"But the sun-bath is not to count as a swim," suggested Charley.

"Agreed!" shouted the other boys in unison.

"We had no chance of examining the part of the island where, during high tide, the waters pour over the land from the outside lagoon," said Jack. "If there is any kind of a waterfall at this place, it'll be jolly fun when we go in swimming to take a shower-bath."

"That will be splendid," said Charley.

"You bet it will," added Harold.

"It'll be high tide in about two hours from now," said Charley. "There will be plenty of time to land and walk around the island before taking our bath. Where shall we land, Jack?" he continued, addressing the leader.

"We had better land on the western side of the island as the captain wishes us always to do, during the running out of the tide. We do not know how long we will be on the island, and don't wish to be compelled to hurry away for fear the ebb tide is becoming too strong."

When they landed, instead of walking to the break

in the reef where they intended having a swim—along the southern half of the island, in the route they had taken on the preceding day—they followed the northern half, since, as Jack remarked, this would give them the opportunity of examining the remaining portions of the island.

"I say, Jack," exclaimed Charley, as they were walking over a part of the island where the soil was unusually deep, "this is not coral sand, is it? It's much darker in color, and instead of being white on the inside like all the soil we have seen, is quite black; at least," he added, "the large particles are."

"You're right, Charley," said Jack, examining the piece that Charley had broken in two. "This is not coral sand. It is like the volcanic ashes Harold and I saw while on the brig off the Aleutian Islands."

"Whatever it is," said Charley, "it seems to make a rich soil."

"It certainly does," replied Jack. "Indeed, the captain told us that some of the richest soils in the world consisted of weathered volcanic ashes."

Proceeding now toward the east they reached a portion where the depth of the soil was greater than anything they had yet seen. Here the cocoanut palms and other vegetation were unusually luxuriant. While walking through this part of the island they came to a place characterized by a strange absence of trees. This absence, however, was not due to a lack of fertility of the soil, as could be seen from the richness of its vegetation.

"If I did not believe," said Jack, "that Harding Island is uninhabited except by our party, I would say this looked remarkably like a clearing."

"It certainly does," said Charley.

"Look here," cried Harold, who had gone a short distance ahead, and came running to them with a plant in each hand, "what do you think of these? Onions growing on a coral island." Holding out his right hand and showing a splendid specimen of that plant with long green stalks and a bulb fully two and a half inches in diameter. "And also sweet potatoes! What do you say to this for a sweet potato?" he said, holding out a potato that certainly weighed nearly five pounds.

"They are both beauties," answered Jack. "You've made a great discovery, Harold."

"How did these things get here, Jack?" inquired Harold.

"I guess they grew, Harold," said Jack laughing.

"Oh, come," exclaimed Harold, "no fooling, Jack. How do you suppose they got here."

"Well, Harold," said Jack more seriously, "I suppose they were planted here."

"By whom?" persisted Harold.

"By the man or men who made this clearing."

"So you think it's a clearing, do you?" inquired Harold.

"I think so," replied Jack. "What do you say, Charley?" he continued, turning to him.

"I know it's a clearing," said Charley.

"Hello," exclaimed Jack. "How do you know that, Charley?"

"By this," was the reply, pointing to the stump of a cocoanut tree that had been covered with a creeping vine. "As you can see, this tree has been cut down. Look at the marks of the axe."

The evidence was indeed conclusive. Axe marks could be distinctly traced on the stump that was left standing in the ground.

"You're right, Charley," said Jack. "And look here, this vine which covers the tree looks something like the sweet potato vine that I have often seen growing in England. Let's dig at its roots and see if we can find any tubers."

It was not a sweet potato vine, although it somewhat resembled one. Uncovering its roots a number of tubers were seen resembling sweet potatoes, only very much larger.

"I think it looks like what in Western Australia is called the yam," remarked Charley. "A yam is like a sweet potato and can be eaten when either baked or boiled."

"They are pretty large at any rate," said Harold. "I should think this fellow," he said, raising one with difficulty from the ground, "must weigh nearly a hundred pounds."

"Let's build a fire and cook one of them for dinner," suggested Harold.

"I think we had better wait until we show it to the captain," replied Jack. "Some tubers are poisonous.

I hardly think this will be, since it has evidently been cultivated. However, we will take no risks and will, therefore, show it to the captain before eating it."

An examination of the clearing—for it was evidently a clearing—showed that it had been used as a vegetable garden; for, besides large-sized beets, they found, almost choked by a dense growth of native plants, specimens of aromatic garden herbs, such as thyme, sage, and parsley.

Rompey, who had of course accompanied them, showed some excitement whenever they came near the eastern boundary of the clearing. Here he ran from place to place, growling, as if he had detected something that did not please him. He acted, however, as though he was undecided about the matter and finally appeared to come to the conclusion that he was mistaken, and that everything was right.

"How about that swim, Jack," said Harold. "We have been here now for so long a time that we'll miss the best of the high tide if we don't look out."

"I am not sure, Harold," said Jack, "but that we should stay here and look carefully to see what evidences there are of any one having ever lived here. What do you say, Charley; shall we give up the swim and spend the rest of the day in this part of the island, or shall we leave this work until the captain and Hiram come, as they probably will to-morrow or the next day."

"Just as you say, Jack," replied Charley. "But a swim would be nice, wouldn't it?"

"Very well," said Jack laughing; "but first let's collect some of the onions, sweet potatoes, yams, beets, and herbs, and place them so that we can get them on our return."

As soon as this was done, without examining the portion of the island lying between the clearing and the northeastern coasts, the boys made their way to the shores of the lagoon, and rapidly walking along it, soon reached the portion of the coast lying on the eastern side of the island opposite Parker Cliffs.

It was high tide. They were now on that portion of the eastern coast that was devoid of vegetation, and which, as already mentioned, was lower than the remainder. Here, at the lowest part of the reef where the distance between the outer and inner lagoons was in the neighborhood of only fifty feet, a portion of the solid limestone had been cut or worn away, so as to form a channel through which the waters from the outer lagoon were pouring into the smaller lagoon. The depth of water in the channel was about three inches.

They were disappointed at first in finding that, contrary to Jack's expectations, the water did not pour over the edge of the channel in a waterfall, but discharged immediately into the lagoon. They could not, therefore, enjoy the shower-bath Jack had referred to. But in this, as in many happenings in life, that which actually existed was far better than what they had hoped to find.

Take a lively boy and show him something he has

never seen before, that is capable of being utilized for his pleasure, and note in how wonderfully short a time he will get fun out of it. If this is true of one boy, it is much truer where there are three boys as bright and jolly as the three who were standing undressed on the edge of the channel near its higher end.

Charley, who was by far the quickest of the boys to see how things of this kind could be utilized, had already assured himself that the water was quite deep at the lower end of the channel where it emptied into the lagoon, and that all portions of the channel in the solid limestone were almost as smooth as a piece of polished marble, quickly made up his mind what to do. Sitting down in the channel with his face toward the lower end, he experienced the novel but delightful sensation of being rapidly swept over the smooth surface of the channel in which he was sitting until he was unceremoniously dumped into the deep waters of the small lagoon.

I am sure I need not tell my boy readers, that as soon as Jack and Harold saw the success attending Charley's utilization of the channel they followed him. Soon, all three boys were rapidly sliding, one after another, down the great natural sliding-board of their swimming-pool on the eastern end of Twin Island No. 1.

"Talk about sliding-boards," cried Harold. "This beats them all!"

As was natural, each boy tried to vary the method of sliding down the channel. Jack tried to slide down

standing erect, and indeed succeeded in maintaining an upright position until he was midway between the waters of the two lagoons, when the motion of his feet becoming greater than that of the rest of his body he suddenly sat down in the water so quickly that he made the rest of the journey on the flat of his back, and was soon dumped into the smaller lagoon.

"Try it again, Jack," said Charley, as Jack emerged from the water, "and lean backward like this," he continued, starting from the top and beginning to slide down the channel.

Charley's method was successful, and reaching the end he was able to make, as it were, a running dive into the water.

After enjoying the sliding-board for nearly half an hour they walked along a portion of the platform at the edge of the smaller lagoon to a place where the water was quite deep, so as to permit them to dive directly into the lagoon.

"What a splendid place this would be for a springing-board," exclaimed Harold. "If the captain and Hiram come to-morrow to look at the clearing, as I think they will, we'll get Hiram to build us a springing-board here."

"Now, let's take a sun-bath," said Charley. "We won't put our clothes on. There is sure to be something in the water we'll want to get. Besides, we have hardly been in longer than an hour, and if we stay out for a while and get warm, there will be no objection to our taking another swim, will there, Jack?"

"I think not," replied Jack. "You know we agreed to take two swims."

Adopting Charley's suggestion they wandered along the beach of the lagoon until, coming to a place where the sand was unusually fine and soft, the two younger boys, as they had agreed to do, suddenly jumped on Jack, and after no little struggle, for Jack was quite strong, threw him on his back, and sitting on him commenced good-naturedly to pommel him. The boys did this because they wished to get even with the kidding Jack had given them when he wanted to know which of them should have the smaller of the Kid Islands named after him.

Jack did his best to break away from the youngsters, but while he could easily have managed one of them alone, he was unable to cope with the two together; for they were both well-developed boys, and their life in the open air, both on the brig and since, had greatly strengthened them. When, therefore, Charley cried:

"Have you had enough, Jack? Will you take back what you said about our being kids?"

Jack cried good-naturedly:

"Yes, I've had enough. I acknowledge you two are more than I can manage. Let me up."

They now crossed the channel and continued their walk along the shores of the lagoon in the opposite direction, and again entering the waters were soon swimming in the deep water near the shore. What rendered the swimming so pleasant was the wonderful clearness of the water; for in the waters of this por-

tion of the lagoon there was an almost complete absence of sediment, so that, wherever the surface was unruffled by the wind, they could distinctly see objects no larger than one of their hands in water at a depth of fifty or even sixty feet.

Besides the numerous species of differently colored coral polyps, they saw among other objects visible on the bottom of the lagoon a number of the oysters the captain had told them on the previous day were of the species apt to contain precious pearls.

"If we had a raft here," said Jack, "we could easily reach some of these oysters by diving."

"Let's ask Hiram to build us a raft," said Charley. "We can bring for this purpose some of the boards we got from the brig. A raft would be very convenient for going to different parts of the lagoon."

"Especially," said Jack, "if at the same time he'll rig up a sail with one of the blankets. We can then easily go from one part of the lagoon to another."

While swimming over one portion of the lagoon they came to a place where a number of pearl-oysters were growing in comparatively shallow water, being about fifteen feet in depth.

"Can you touch here, Jack?" cried Charley. "Let us see if we can get one of those oysters. I'm sure the captain would like to have it."

It would have been easy to reach the bottom at this place by diving, but it was difficult to do so from the surface while swimming, but after several unsuccessful efforts, Jack and Charley were each able to bring up a

splendid specimen of pearl-oyster. Harold, who tried to do the same thing, was obliged to give up the task as too much for him.

"Now let's see if these oysters contain any pearls," said Jack, when the boys had reached the shore.

"How can we open them?" inquired Charley.

"We'll loosen the shells by resting their edges against a fragment of limestone rock on a bare portion of the beach, and break it with a smaller piece of rock," replied Jack.

When this was done they opened the shells by means of the large blade of a penknife Jack got from his coat. Nothing was found in the first oyster, but in the second they found a fairly large pearl that was not only wonderfully clear and transparent, but also possessed the power of shining brilliantly when held in the sunlight. The light thus emitted was not like ordinary white sunlight, but displayed the rainbow colors or, as it is known in mineralogy, the pearl possessed iridescence.

They took their second bath without having dressed after the first bath. On coming out of the water after this bath, they dressed and retraced their steps towards the boat, not forgetting to stop at the clearing for the vegetables and herbs they had collected, but also a specimen of the soil. Rompey again showed an uneasiness by barking when they passed the northeastern portion of the clearing but, as before, he soon quieted down, and appeared to be satisfied that he was again wrong in supposing there was anything objectionable in the neighborhood.

When they reached the boat on Harding Lagoon on the western end of the island they started a fire and prepared and ate their dinner. Then, pushing off the boat, they rowed in the direction of Jackson House, where they arrived before supper-time, greatly pleased with the day and especially proud of the things they were bringing back with them.

CHAPTER XIV

The Unburied Skeleton and his Buried Treasure

It was, indeed, a splendid boatload of specimens they were bringing back with them. Naturally, therefore, the boys felt elated at their success.

"I wonder whether they will be more surprised or more pleased at what we have done, Jack?" inquired Harold.

"The captain will be the more surprised when he hears of the clearing we have discovered, and Hiram will be the more pleased when he sees the cookable things we have brought him," was the reply.

"You're right there, Jack," said Charley, "but I think there is another thing that will surprise the captain almost as much as the news of the clearing and its cultivation."

"What's that?" inquired Jack.

"That we have failed to bring him information concerning the person or persons who cleared and planted the vegetable garden. They must surely have left some traces. We should at least have been able to find the house, if not the people themselves, provided they are not dead or have not already left the island. I am sorry, Jack, that instead of encouraging you to look up this matter, I was so anxious to get a

swim that I persuaded you to leave the search for another time."

"Don't take all the blame, Charley," said Harold. "It was I who first suggested taking a swim while the tide was high."

"You're right, Charley," said Jack, "we all acted boyishly in not making the search, but I am more to blame than either of you, since I am the leader. I think, however, there is no great harm done, but we must frankly acknowledge to the captain that we have acted very thoughtlessly."

"Look, Jack," said Harold, as the boat drew near the landing-place near the house. "The captain and Hiram are both coming to meet us."

They anchored the boat at the landing as the two men reached the boat.

"Well, boys," said the captain, "did you have a good time? Have you anything of importance to report?"

"We have had a splendid time, Uncle Arthur," cried Harold, "and have much to tell you."

"Look here, Hiram," cried Charley, holding up a big sweet potato in one hand and a number of big onions in the other, "do you think you can do anything with these?"

"Sartinly, my lad," replied Hiram grinning. "Pertaters and inyens. Whar did ye git them beauties? Hev ye been to an English market? I have heerd my messmates talk much about the kind of wegetables wot grow in these parts, but I hain't ever yet

heerd that pertaters and inyens grew so far from England."

The captain was greatly surprised at what Charley was holding up in his hand.

"Hiram," he said, "some one either still is or has been on Harding Island. Potatoes and onions don't grow naturally so far south of the Equator, although they are both capable of being cultivated in these latitudes. Look at what Charley is holding up, Hiram," as Charley held a huge beet whose weight was as much as he could manage, while Harold was exhibiting bunches of thyme, sage, and parsley.

"I see 'em, cap'n," exclaimed Hiram, "and am tarnation glad; for they'll cook splendid. Ez to how they got here I kain't say. I don't deny, howsumever, that they hev been planted, as ye say."

Harold who had now dropped the herbs and was holding up one of the large yams, now cried to Hiram:

"Do you know what this is, Hiram? Can you roast it? Is it good to eat?"

"Do I know a yam when I see it?" replied Hiram. "Many sich hev I prepared fer eatin'. I kain't say yet whether I like 'em better roasted or biled; though, if well done, I think the fust method beats the second, fer a nice roasted yam is wery mealy and wery sweet."

"Come, Jack," said the captain anxiously, "tell me all about this wonderful discovery. Were there signs of a garden or clearing? Was the garden in good order as if it had been attended to recently? Let me hear about it."

"There was a clearing," replied Jack; "but the garden, for I think it was a vegetable garden, looked as if it had been planted long before I was born. There were weeds everywhere that had nearly choked the life out of most of the things that had been planted. This was especially so with the herbs. The beets, sweet potatoes, and what Hiram calls yams, had held their own, and were in a flourishing condition."

"That was to be expected," said the captain, "beets, sweet potatoes, and yams thrive within the tropics, while the herbs generally prefer a cooler climate. Did you see anything that proved to you it was a clearing in which these things were growing?"

"There is no doubt about that, captain," remarked Jack. And he then told the captain of the stumps of cocoanut palms and other trees still standing in the clearing that exhibited undoubted evidence of having been cut down.

"Did you notice anything unusual about the depth or character of the soil?"

"Yes, captain," was the reply. "Here is a specimen of the soil we brought to show you. I think it consists of volcanic ashes. See," he continued, handing it to the captain, "it looks like the ashes that fell on the brig when we were off the Aleutian Islands. At least," he added, correcting himself, "how I imagine the ashes would have looked after they had been exposed to the air and water for many years."

"Yes, Jack," replied the captain, "this soil is formed of volcanic ashes. Was it a deep soil?"

"Deeper than any we have yet seen on the island," was the reply.

The captain was silent for a while, and at last said:

"Of course you took pains carefully to examine the neighborhood of the clearing to see if there was a house or place of the person or persons who made the clearing and planted the garden. What did you find?"

They were greatly mortified when the captain put this question. Jack, however, did not hesitate, but said in a manly way:

"Captain, I'm ashamed to say that we did not make any examination of the neighborhood. We wished to take a swim, so we left the place practically unsearched. I see now that this was a very thoughtless and foolish thing to do. I hope that you will forgive me for acting in this way."

"But it was not all Jack's fault, Uncle Arthur," cried Harold. "I was the first to beg Jack to go with us to the reef. The tide then was probably high, and Jack thought we could get a shower-bath where the tide ran over the island from the outside lagoon to the smaller lagoon."

"I was to blame too," cried Charley. "I also wanted Jack to go swimming."

It was evident that the captain was both surprised and disappointed, but seeing how badly the boys felt, he said:

"Well, there has been no great harm done. I must not forget that you are only boys. Hiram," he said,

turning to the boatswain, "we must go early to-morrow and make a careful search in the neighborhood of the clearing. I am sure we'll find traces of the person or persons who made the clearing and planted the garden."

They would have cared far less if, instead of excusing them on the plea of their being only boys, he had soundly berated them. They especially wished the captain to regard them at least as being manly. When, therefore, he excused them because they were only boys, they felt the reproof keenly, especially Jack.

Seeing this, the captain, wishing to pass the matter over, said:

"Tell me what else you did, Jack. Did you all have a good swim? Come, let me hear what you saw in the part of the island where the high tide washes over from the larger into the smaller lagoon."

The captain was greatly interested in what Jack told him about the channel between the waters of the larger and the smaller lagoon, especially about the amount of water that passed through the channel at high tide.

When they had explained to the captain the fun they had in sliding down the channel into the lagoon, Harold, turning to Hiram, said:

"Hiram, when we go to-morrow won't you take some boards and build a raft, so that we can go about from place to place on the lagoon?"

"Yes," added Charley, "and also put up a springing-board, please, for us. The waters are so clear and

pleasant at this part of the lagoon that they make the best swimming-pool I've ever seen. The sliding-board is at least fifty feet long. Its bottom is almost as smooth as a piece of polished marble, and the way one can slip down in all kinds of positions from the top to the bottom is just splendid. If you can put up a springing-board on one side of this channel we can also have a great time diving. Moreover, captain," he added, "there are no sharks in this lagoon as there are in the Harding Lagoon, so the swimming is safer."

"Captain, I wish to say how thoroughly I am ashamed of myself in permitting the boys to persuade me to act in so childish a manner. I can assure you that such a thing shall never occur again when I am left in charge of the boys."

"Jack," said Charley, "show the captain the pearl we found in an oyster we took from the lagoon by diving."

Jack handed the pearl to the captain, who told them that it was a splendid specimen of a form of pearl called an iridescent pearl, on account of the colors of the rainbow it displayed when held in the sunlight."

"Hiram," he said, turning to the boatswain, "when we have built a raft we must try to rig up some form of dredge by which we can take the oysters from the deep water. If we can get a number of pearls like this they would be very valuable."

"I kin easily rig up sich a thing," said Hiram, "so thet we kin become pearl-fishers."

They had reached the landing several hours before

supper. There was, therefore, time to begin preparations for leaving early the next morning. Hiram selected boards suitable for the construction of a raft, the boys carrying them down to the boat and placing them where they could be readily towed after it. They also placed the necessary provisions in the boat since, as the captain said, they might find it advantageous to stay overnight on the island.

That night there were two new dishes on the table that all thoroughly enjoyed. These were boiled onions and a baked yam.

"Why can't we start a vegetable garden near Jackson House, captain?" inquired Charley. "Things grow so rapidly here it would pay us to bring soil from other parts of the island and start both a vegetable and flower garden."

"We'll do so, Charley," said the captain. Boys," he added, "whenever you get the opportunity don't forget to bring good soil here for starting our garden."

They were able to make an early start next morning, so they had landed their boat on the island, moored it, and reached the clearing after a brisk walk, only a little after nine o'clock. After making a careful examination of the place the captain said to his companions:

"There are plenty of evidences of the garden having been long neglected," and he then pointed out to them that the stumps of the trees in the clearing showed signs of having been exposed to the elements for

many years, and that the cultivated plants had been choked out in most places by the native plants of the island. He endeavored, as far as possible, to mark out the limits of the cleared tract. In one place he found the ground covered with a dense growth of a plant closely resembling sugar corn. This, he told them, was a variety of sugar-cane, and soon each of the party was sampling tender pieces of the stalks, sucking the sweet juices with which they were loaded.

While walking over the clearing they came near its northeastern end, when Rompey began to manifest uneasiness, barking every now and then, as if he did not entirely like something in the neighborhood. Charley at once noticed this and said to the captain:

"That's the way he acted yesterday. There is something here that greatly excites him. Look," he continued, "he is trying to follow a scent, but is unable to do so."

As Charley had remarked, Rompey was running to and fro, but was unable to find any scent on the ground. Just then, however, the wind began to blow from the northeast, when the dog, with an angry bark, ran rapidly in the direction from which it came. His barking grew fainter and fainter as his distance from them increased. At last, however, it ceased to decrease in loudness, thus showing that the animal had stopped running and was standing and barking at something.

"He has run something down," said the captain. "Let us follow and see what it is."

When they reached Rompey they found him stand-

ing at the back of a small, low cabin built of the logs of trees somewhat after the fashion of the old log cabin. When Rompey heard them approach, he turned around as much as to say:

"I don't altogether like this. Hadn't you better look at it?"

"We will hardly find any one living in that cabin now, boys," said the captain. "It appears to have been built from some of the trees that were cut down to make the clearing."

The captain had good reasons for his belief that they would find no one living in the cabin. Its roof that had apparently at one time been thatched, had completely disappeared, and from the opening there could be seen something they were quite unable to understand; namely, the graceful, drooping foliage of a cocoanut palm that was apparently suspended above the top of the roof from some invisible support in the air.

Walking rapidly to the front of the cabin, they saw both a window and a door. The window was in place and was shut, but the door had fallen from its support, thus permitting a flood of sunlight to enter and illumine a small room with an earth floor that occupied the whole enclosure. This light, together with that which poured in through the open roof, showed a rude bedstead formed of logs, about two feet in height. On the bedstead was a skeleton of what had evidently been a man, for a few tattered remnants of a man's clothing still covered it. The man had been dead for many,

many years, for the skeleton had been bleached by long exposure to the sun and air.

But what was still more curious, there had sprung up, a few feet from the foot of the bed, in the ground that formed the floor, a mighty cocoanut palm tree, the trunk of which extended through the open roof, to a height of at least fifty feet. The tree, judging from its height and general appearance, must have been growing many, many years, so that the man whose skeleton was lying on the bed, had been dead for a long time.

"Poor fellow," said the captain. "He was probably alone when he died. If any one had been with him they would almost certainly have buried him. Let's see if there are any papers that will tell us who he was, how long he had been on the island; whether he had any companions, and about when he died."

"Cap'n," said Hiram, pointing to a box that was lying underneath the right hand of the skeleton, "I reckon that 'ere box wuz the last thing the dying man touched."

"Yes," was the reply of the captain, "and we shall probably find in it some writing that will give us the information we desire. From the position of the box, I think the man was alone when he died, and that, as you suggest, almost his last act was to place in the box some information he wished to give to any who might chance in after years to visit the room."

Opening the box, the captain took from it a sheet of paper on one page only of which something was written in English. At first he had difficulty in de-

ciphering the writing, owing to the fading of ink; but at last, succeeding in making it out, he read the following aloud to his companions:

On a Lonely Island in the Pacific, July 17, 1783.
(At least this is the date as nearly as I know).

To the party or parties who first read this letter:

I, John Maddox, of Portsmouth, England, Captain of the Morning Star, a brigantine equipped as a pearl fisher and bound from London to the South Sea Islands, was wrecked on this island June 6, 1733. The vessel was sunk in the deep waters of the ocean off the high cliffs at the northeastern part of the main island. All on board were drowned except myself. I have now been alone on this island for about fifty years. Feeling that my death is near at hand, and being unwilling that the treasures I have collected shall be lost, I write to say that unless the wreck has gone to pieces, my treasures will be found in a box placed on a table in the cabin of the brigantine, that lies beneath the waters of the ocean off the southeastern coast of the island.

During the fifty years I have been on this island no ship has ever visited it. It is true that I have at rare intervals seen a few vessels at a great distance from the island, but all too far off to enable me to attract their attention. About ten years before my death, sometime in 1773, a war-canoe containing ten dark-skinned men was seen off the southeastern coast. They made an attempt to land, but the breakers being high, the canoe was nearly wrecked, so they left and have not since returned. As this island has no good landing-place for even a boat, it is unlikely a ship will ever visit it.

I am dying and, having no one to whom I can leave my buried treasures, I hereby bequeath them to the person or persons who open this letter, to be shared in equal parts whatever their age may be. This bequest, however, is conditional on their giving me Christian burial. May God have mercy on my soul!

"Poor man," said the captain, "he seems to have lived all by himself on this lonely island during fifty long and weary years."

"I wonder, captain," said Jack, "of what these treasures consist?"

"Very probably," said the captain, "of the pearls he has collected during his lifetime."

"Are there no other papers in the box?" inquired Jack.

"Yes," said the captain looking, "here is a paper containing a list of five or six hundred pearls with the weight and character marked opposite each. There is nothing to show that this list has any connection with the treasure referred to. I think, however, this is very probable."

"Cap'n," said Hiram anxiously, "ef this here treasure consists of pearls, ez would seem probable, en the list ye've read correctly describes the size and kinds of them pearls, I reckon they must be worth a sight of money, fer they're all onusually big. Pervided, however," he added anxiously, "they hev been placed in a water-tight box."

"Why, Hiram," inquired Jack, "would the pearls be injured by exposure to water?"

"I fear, Mr. Jack," said Hiram, "the water would spile them."

"Yes," said the captain, "and even if the water did not render them dull and lusterless, we might find them coated with a crust of living coral. However," he added, "since the brigantine has been in the water

since 1733, and it is now 1904, the wreck is about one hundred and seventy-one years old, and has probably gone to pieces long ago. Even if it has not, we may find it in water so deep that it would be impossible to reach it without regular diving apparatus."

"But we'll take a try at it, cap'n, won't we?" inquired Hiram.

"Yes," was the reply, "we will go there in the other boat early to-morrow or the day afterward."

"Now, Hiram," said the boys, "let's begin building the raft, take it to the channel opposite the swimming-pool, put the springing-board in place, and then we will have another splendid swim."

This was finally done, and the boys again enjoyed the magnificent natural sliding-board of the swimming-pool, as well as diving from the springing-board.

The captain joined them in the sport. Hiram, however, excused himself on the plea that he didn't care much for swimming.

When all had dressed after the swim the captain, turning to Hiram, said:

"Have you a spade in the boat, Hiram?"

"I hev," was the reply, "I brung one with which to dig up some yams and sweet pertaters."

"Then let's dig a grave for the remains of the poor fellow who has so long been denied Christian burial."

Again visiting the lonely cabin, they dug a grave in the rich soil at the foot of a near-by cocoanut palm, when, after repeating portions of the beautiful Episco-

pal burial service, they reverently committed the remains of John Maddox to the earth.

"The next time we come here," said the captain, "we'll erect a headstone."

It may be mentioned that this was subsequently done, Hiram making a wooden cross, on which the captain carved:

JOHN MADDOX, OF PORTSMOUTH, ENGLAND,

DIED ON THIS ISLAND,

JULY 17, 1783,

AFTER A LONELY SOJOURN OF FIFTY YEARS.

BURIED 1904.

CHAPTER XV.

The Coral-encrusted Wreck

Early next morning boat No. 23 might have been seen approaching Parker Cliffs. The captain was reading the letter that had been found in the box, on which had been resting the bony hand of the skeleton found in the rude hut not far from the clearing on Twin Island No. 1.

"This letter," he said to his companions, "gives very vague instructions as to the exact place the brigantine was wrecked. Listen," he continued, "this is all it says as to where the wreck occurred: 'The vessel was sunk in the deep waters of the ocean off the high cliffs at the northeastern part of the main island.'"

"There be a fair stretch of high cliffs," said Hiram grinning; "all of which kin be said to lie near the nor'eastern part of Harding Island."

"That's just the trouble, Hiram," remarked the captain. "However, it's certainly worth our while to carefully search all this part of the coast. We may be able to find the wreck if it has not been broken up and completely washed away by storms."

It was then high tide, but the waters were so clear that they could distinctly see the bottom at fairly considerable distances off the edge of the shore platform. They slowly rowed the boat over the deep water along

the entire coast opposite the cliffs, but found no traces whatever of the wreck.

"I fear, Hiram," remarked the captain, "the brigantine has gone to pieces. We must not forget she has now been in the water for over one hundred and seventy-one years, and that, during this time, many severe storms have occurred."

"I'm afeerd ye're right," replied Hiram in a regretful tone. "I reckon none of us will get any of the waleable pearls the skeleton had collected when he warn't a skeleton."

"But, captain," remarked Jack, "these storms may not have broken up the vessel. They may have only moved her to another place. If they have taken her to the deeper waters, there's no hope of our finding her; but, on the other hand, they may have washed her into the shallower waters nearer the edge of the platform. Now, there is a large part of these waters that we have not as yet examined. Suppose we take the boat nearer the shore where we can examine the shallow parts."

Jack's plan was adopted; so they began slowly pulling the boat along the shore, but this time nearer the edge of the shore platform. After doing this for some time they at last came to a place, about a quarter of a mile north of a place where a deep gap had been broken in the cliffs. This, it will be remembered, was the place at which they landed on their first visit to the cliffs, and following the gorge had reached the highlands between Charles and Harold Hills. Here there

was a change in the inclination of the shore platform. Instead of suddenly descending toward the ocean it reached it by a gradual slope.

"Ef the wessel hez been washed by the waves toward the island," said Hiram, "here'll be the place whar we orter find her. Boys, ez the cap'n and I row slowly, keep your eyes on the bottom."

As they rowed in this manner, Charley, who had been leaning over the bow of the boat with his face near the water, suddenly cried in an exultant tone:

"I see the brigantine. There she is lying with her stern toward the shore."

Instantly stopping the boat and looking down into the clear waters they could plainly see a wreck lying, as Charley had reported, on the inclined bottom, with her stern nearer the shore. She had evidently been gradually carried by the waves up the gentle incline and was now resting, stern-on, in about two fathoms of water with her bow in slightly deeper water.

"Do you think this is the vessel we are looking for, captain?" inquired Charley.

"I think so," said the captain, "but of course I cannot say. However she's a brigantine. Don't you think so, Hiram?" he inquired of the boatswain.

"She's a brigantine all right," was the reply; "at least ez fer ez one kin tell in a wessel whose mast and rigging hev all been swept away a-many years ago. But I say, cap'n," he continued, "she is sartinly the oddest looking wessel I've ever seed. She's kivered all over with white stuff."

"A growth of coral has formed a crust over the vessel, Hiram," answered the captain.

"I reckon you're right, cap'n," said Hiram, taking a closer look. "I kin now see a lot of corals growing near the bow like the trunks of small trees, and now my eyes are getting more used to looking through the water, I kin see barnacles on the sides of the wessel."

"Captain," said Jack, "Charley, Harold, and I are pretty good divers; Charley especially. I think we might manage to reach the deck of the vessel and even to enter the cabin. Shall we try it?"

"I think so, boys," was the reply, "and Hiram and I will help you. Hiram, I guess you'd better wait in the boat. You will probably be of more help in the boat than in the water."

"You're right for sartin, cap'n," said Hiram grinning.

Anchoring the boat immediately over the wreck they undressed so as to try to reach the deck by diving. Before doing this, the captain pointed out the dangers they ran either by being cut, or by becoming entangled among the growing corals. He also cautioned them to avoid coming in contact with the tentacles of the larger growing coral polyps, since they could sting severely.

It did not take the captain long to discover that the boys greatly surpassed him in diving, and that, moreover, none of the boys could equal Charley in this direction. While the lads had no difficulty in reaching the deck, yet the growing corals were pain-

ful to their feet and hands since, of course, they could only keep on the deck by clinging to it.

They had anchored the boat over the vessel near an open companionway leading down into the cabin. From this position they could see into the cabin, the door of which had been carried away.

"After they had all made a number of dives, Charley at last succeeded in reaching the companionway, and holding on to the door-jambs, got a momentary glance at a table in the middle of the room.

On regaining the surface and climbing into the boat, he said:

"There's a large iron box lying on the table."

"Thet's the box ez hez been mentioned in the dead man's letter," cried Hiram excitedly. "Do ye think ye kin git it next time ye go down?"

"I am not sure," replied Charley. "I would not like to be caught in the cabin near the ceiling. If I should lose my hold on the door or table I would of course be pushed up by the water. Captain," he said, "suppose you and Hiram rig up a rope with a heavy weight, and lower me with it down to the bottom of the steps. If you landed me at the entrance of the cabin, and I had another weight attached to me, I am sure I could safely reach the table and get the box. Then, regaining the rope, I could count on you quickly raising me to the surface."

At first the captain was unwilling Charley should take this risk, but was at last persuaded that the dangers would not be very great.

"All right, Charley," said the captain, "I'm willing you should try this, but the tide is now beginning to run down. Suppose we wait until it is at its lowest. The water will then be only about half as deep as now. I think the plan you propose will then be thoroughly safe. Indeed," he added, "at low tide I think we might get along without the rope. However, we'll get everything ready so that if it is necessary to use the anchored rope we can do so."

Rowing the boat to the shore, they secured a fairly large fragment of coral rock which they tied to the end of a rope, and then selected another smaller piece of coral rock, intended to increase Charley's weight while entering the cabin.

They remained on the shore until the tide had ceased running down, when they again anchored the boat immediately over the companionway. The water was now only about six feet above the deck at the stern of the boat, and therefore about twelve feet over the floor of the cabin. Indeed, it was so much shallower that Charley thought there was no necessity for the use of the anchored rope, but the captain, feeling that it would be safer, insisted on his employing it. With the smaller stone attached to his body so that he could easily loosen it, Charley took his place on the heavier stone at the end of the rope, and holding onto the rope with his hands, was rapidly lowered to the foot of the companionway. Entering the cabin, and keeping hold of the table with one hand, he approached the iron box. On attempting to lift it, he found it was firmly

fixed to the table by a coating of coral. Still holding on firmly with one hand to the table, he separated the stone attached to his body, and by its aid soon loosened the box on the table. Finding the box heavier than the stone, he left the latter on the table and carrying the box reached the anchored stone, when he was soon raised with it to the surface and lifted by the captain and Hiram into the boat.

Charley's companions greeted him with loud hurrahs. Naturally, they were greatly elated at the success that had so far attended their efforts to get the treasure that had been willed to them by the dead man.

But there remained an uncertain element that lessened their rejoicings. They had no doubt that this was the box referred to in Maddox's letter for, so far, everything tallied with the information it contained. But was the box water-tight? That was the important question. Its appearance certainly warranted the belief that they would find it water-tight. It was not only made of iron, but was covered with a varnish that had resisted the corroding action of the water; for no iron stains were visible. Like the top of the table, and indeed like everything on the vessel, it was covered by a coating of coral that was deposited on the joints between its sides and the lid, though not so thick as to prevent them from seeing that the joints were well made.

Of course they were all anxious to open the box.

"We'll have to break it open," said the captain.

"Even if we had the key it would be useless, since the lid is firmly bound to the box by a coating of coral. Have you anything that will aid us in opening the box, Hiram?" inquired the captain.

Hiram grinned as he took a cold chisel and hammer from a locker in the boat where he had placed them.

"I reckon these'll do, cap'n," he remarked. "Give me the box, I'll open it."

"You felt pretty sure of getting it, Hiram, didn't you?" inquired the captain smiling.

"Wall, I sartinly hoped we would, and thought I might ez well come prepared like," was the reply.

Under Hiram's skilful use of the cold chisel and hammer the box was soon opened. The inside was as dry and free from water as when it had been closed by its owner in 1733. It was nearly filled with several hundred magnificent pearls, of sizes that are now seldom obtained, together with a written description of each of the pearls, their weight, and quality, together with an estimate of their probable value. Counting the pearls, they found that there were nearly eight hundred.

"Maddox estimates the pearls as being worth, in 1733, something in the neighborhood of twenty thousand pounds, English money," said the captain.

"Gracious," exclaimed Harold in an astonished tone, "that's a big lot of money!"

"It sartinly is," chuckled Hiram. "It's the same ez one hundred thousand dollars United States money and, sence the letter said this wuz to be ekally diwided

among all them as found it, no matter wot their age, it'll be twenty thousand dollars each. That's not a small sum for each of us."

"But," said the captain smiling, "that was in 1733. Pearls of large size are now probably worth two or three times more than they were then."

"I kin stand the change in price, cap'n," said Hiram grinning.

The captain who had brought with him the papers found in Maddox's box, began comparing the paper in the box of pearls with the paper found at the log cabin. The two papers closely agreed. Completing the examination, he said:

"The paper in the box of pearls is an actual description of the pearls as they were added a few at a time by Maddox. You can see," he continued, showing his companions the paper, "the entries appear to have been made at different times. The other paper was apparently written by Maddox from memory. Both these papers are practically the same, thus showing that Maddox remembered very well the pearls he had collected during the many years he had been searching for them."

Now they had taken from the sunken brigantine its buried treasure, they had plenty of time more closely to examine the coral that was growing on different parts of the vessel. In the portions near the bow that Hiram had described as resembling a small forest, there was growing a coral known as the madrepore, a branching form of coral polyp resembling a tree with-

out leaves. In several places these corals had attained the height of nearly twelve feet. It was evident, therefore since the brigantine had been sunk in 1733, assuming, as was probable, that the corals began growing

Madrepore (from Dana)

shortly after the vessel was wrecked, they had grown twelve feet in about one hundred and venty-five years.

"Captain," inquired Jack, "is that an unusually rapid rate of growth for this kind of polyp?"

"No, Jack," replied the captain, "I remember reading that madrepores are known to have attained the growth of sixteen feet in sixty-four years. But the rate of growth of coral polyps varies greatly, not only with different species, but also with the character of the water in which they are growing. Polyps grow more rapidly when directly exposed to the breakers than in sheltered waters. You must not suppose, however," he continued, "that all coral polyps have the same rate of growth as the madrepores. In many species the growth is much slower. See," he said, pointing to the ship's bell that had been covered by a coating of another species of coral, "the growth here has been much slower; it has only attained the thickness of a few inches.

"Of course," continued the captain, "the rate of growth of a coral polyp is entirely different from the rate of growth of a coral reef. The rate of growth of the reef is now generally believed to be something in the neighborhood of one foot for every two hundred years; a depth of five feet would, therefore, require something in the neighborhood of one thousand years."

CHAPTER XVI

The Sea-slug or Bêche-de-mer

The magnificent collection of pearls obtained from the iron box in the cabin of the coral-encrusted wreck, naturally led to many conversations about their peculiarities as well as about the oysters and other mollusks from which they are obtained. This information was derived in part from the captain, but was obtained mainly from some of the books they had brought from the derelict brig.

Nor was the desire for information limited to the captain and the boys. Hiram, doubtless excited by the money interest he had in the collection, often joined them in the reading-room, listening attentively to the conversation or to the readings. Indeed, he was so greatly interested that he would frequently persuade one of the boys to read again what he had already heard.

"I kain't remember things I've heerd read as well as you lads kin, so please let me hear it agin." Which, of course, the boys were always pleased to do.

But their interest in pearls was by no means limited to what they read or heard as to the habits and peculiarities of the pearl-producing mollusks. It led them to make an actual study of the animals themselves. There were excellent opportunities for doing this, since

both in the shallow waters of the ocean near the island, and especially in the quiet and clearer waters of the lagoon, there were several varieties of pearl-oysters, as well as many other pearl-producing mollusks. Among these was the species of giant clam called the tridacna, the largest of all bivalves or two-shell mollusks. Some of the largest shells of this clam weigh as much as five hundred pounds, the mollusk itself often weighs as much as twenty pounds. The shells are exceedingly hard, and are so large that the natives sometimes use them for bathtubs.

While examining a huge specimen of this mollusk, the captain told the boys that its name tridacna was derived from two Greek roots meaning "three bites," in reference to the fact that the animal had to be eaten in three bites.

"It seems to me, captain," said Charley laughing, "it would be pretty hard to swallow that fellow in three bites. He could more easily, being so large, eat any of us in three bites than we could eat him."

With the study of the habits of the pearl-mollusk, they gradually became pearl-hunters. Many excursions were made both in the ocean and the lagoon, and a number of pearls-oysters taken from the waters.

On one occasion the boys had taken a number of pearl-oysters from the lagoon at Jackson House, but on opening them had failed to find any containing excellent pearls.

Harold, who was carefully examining one of the oyster-shells, turning to Jack, remarked:

" Nearly all these shells are coated on the inside with smooth, shining stuff that looks like pearls. See this," he said, pointing to a smooth and glossy coating that gave off colored rays closely resembling those of the beautiful pearls they had obtained from the coral-encrusted wreck. " I wonder, Jack," he continued, " why it is that we find no pearls in these shells. It is certainly not because there is no material to form pearls. Do you know what pearls are made of? "

" Yes," replied Jack, " they consist of the same material as that of which the shell is formed; that is, of carbonate of lime or limestone."

" But not the same kind of limestone as that of which the coral island is formed, is it? "

" Well," was the reply, " they consist of limestone or carbonate of lime that the oyster takes from the water of the ocean while feeding. But this limestone is much purer than that of which the coral islands consist; and besides, I think it is very differently arranged. As the oyster grows it builds or enlarges its shell by lime it takes from the water. Since it is an exceedingly soft animal it is obliged to protect its body by strong limestone shells. It very sensibly makes the outside of these shells rough and jagged, so that other animals would not be apt to rest on it. But it covers the inside of the shell with the smooth stuff that, as you say, closely resembles the material of pearls, and which is, indeed, exactly the same thing. Harold," he continued, " do you know what this material is called? "

" No, Jack; what is its name? "

"It is called nacre or mother-of-pearl."

"Then, why is it, Jack," inquired Harold, "that some of the oysters contain pearls and others do not?"

"I can answer that, Jack," said Charley. "I was reading yesterday in one of the books that when small pieces of sharp, hard substances are lodged inside the shells, the animals try to wash them out, and that when they can't do this, in order to prevent them from irritating their bodies, they begin to cover them with layer after layer of the same material that it spreads over the inside of the shell. It is in this way the pearls are formed."

"Oh, I know, Charley," said Harold smiling; "it's like when a grain of sand or a small pebble gets inside your shoe. It'll soon rub a blister on the foot if you don't get rid of it."

"That's it, Harold," said Charley laughing. "Well, that is the way pearls are formed. Is that right, Jack?" he said, turning to the oldest boy.

"That's the way, Charley," replied Jack. "These little particles may lodge either on the shell, or in the mantle at the edge of the mollusk. The mantle is the part of the animal that secretes limestone from the water. When the particles lodge on the shell they are fastened to it by thin layers of limestone. Pearls so formed, being irregular in shape, are less valuable than those formed in the mantle that are rounded like peas or shot."

"Jack," said Harold, "if that's the way pearls are formed, why can't we force the animals to produce

pearls by putting particles of gritty substances in their mantles? Do you know how long it would take an oyster to form a pearl in this way?"

"I asked the captain that question the other day," replied Jack. "He said it took about two years to form a good-sized pearl."

"I wonder," said Charley, "how old the pearl-oyster is before it is able to form a pearl."

"I believe," was the reply, "pearl-hunters say that the greatest number of pearls are found in oysters that are about seven years old."

"Jack," said Harold, "do you think my plan of growing pearls would work?"

"I'm sure it would," replied Jack laughing. "I'm sorry to disappoint you, Harold, but this plan has been tried many years ago. From very early times the Chinese have forced the animals to produce pearls by introducing little grains of sand, or bits of other foreign matters, inside the shells when, of course, the animal covers them for self-protection. I remember reading that some time ago a great excitement was caused by the so-called miraculous production of pearls inside of which could be seen the image of some one or other of the saints. It is now known how this fraud was perpetrated. It was only necessary to place small images in limestone or other whitish material in the mantles of pearl-producing mollusks, and then afterward carefully protect them from their enemies. In a few years these would be found covered with beautiful transparent layers of pearly matter."

This ingenious fraud appeared to tickle Charley's fancy no little, and caused him to laugh for some time.

"Jack," he remarked, "I remember reading some time ago in Jules Verne's "Twenty Thousand Leagues Under the Sea," how Captain Nemo kept a huge pearl-producing clam or tridacna at the bottom of the sea. In this clam a pearl of unusual size and luster was gradually being formed. The captain was in the habit of occasionally putting on his submarine clothing and visiting the shell in order to cause the pearl to maintain its spherical form by occasionally moving it. Inserting a stick of wood in the shell when open, so as to prevent it closing on his hand, he would remove the pearl, and after carefully examining it would put it back again in such a position that would insure the keeping of its spherical form."

"Harold," said Jack, "if we were regular pearl-hunters, we would not throw away the shells that are covered with the best specimens of mother-of-pearl. We could sell them for good prices."

"What's done with them, Jack?" inquired Harold.

"Among other things," replied Jack, "they are used for making the handles of penknives, table knives, or other ornamental work, as well as for inlaid work for the tops of tables or boxes formed of ebony or other highly colored hard wood."

One can easily see by examining a pearl that it is built up of a great number of exceedingly thin transparent coatings of carbonate of lime. When sunlight

falls on a pearl, instead of passing directly through these coatings a part of the light is reflected from both the upper and the lower surface. In this way the rays from the different surfaces passing through paths of different lengths, are slightly retarded, so that they enter the eye of an observer a very short time one after another. Without attempting to explain how, there is thus produced an interference of the different rays of light, so instead of producing ordinary white light they produce the different colored tints of the rainbow.

The boys were astonished to find, by reading some of the books in the library, that the magnificent colors on many other natural objects, such as the wing-cases of beetles; the scales of the highly colored (and generally poisonous) fish of the lagoon of Twin Island No. 2, whose waters had no connection with the ocean; the feathers of the birds; the wings of butterflies; as well as such minerals as peacock coal were, in a similar manner, due to the interference of rays of light caused by minute irregularities of the surfaces. This matter bothered them so much that Jack one day inquired of the captain if it was possible to so roughen an otherwise colorless surface as to cause it to throw off rainbow colors.

"Yes, Jack," was the reply. "Take, for example, that common transparent substance plate glass, or even a clear glass tumbler, or other article of glassware. If any of these articles are buried in moist ground a slight corrosion of their surfaces occurs. When washed and dried they are found on exposure to the sunlight to

possess an appearance not unlike that of a highly colored soapbubble, or of a piece of peacock coral."

"I remember, captain," said Jack, "seeing in the British Museum specimens of iridescent glass taken from the excavations of Pompeii and other parts of the world."

"Yes," said the captain laughing, "and these specimens commanded such high prices that it was not long before ingenious men discovered how the surfaces of any glass article could be artificially roughened. Indeed, iridescent glass articles can now be manufactured by a process requiring only a few hours or even less to bring about this change."

"But, besides this," continued the captain, "if a plate of clear transparent glass has its surface roughened by ruling on it with a diamond point a great number of lines very close together, in some cases as many as forty-three thousand lines to the inch, a beam of light thrown off from the roughened surface will no longer resemble sunlight but will exhibit rainbow tints."

Their interest in pearl-fishing continued to increase. Many excursions were made, both to different parts of the principal lagoon, as well as to the lagoon of Twin Island No. 1, near the swimming-pool. They obtained in this manner a number of good-sized, well-formed pearls. Hiram had rigged up a form of grappling iron they would lower where they saw a number of pearl-oysters. Then by dragging it over the bottom they would loosen the pearls, and afterward pick them

up by the use of another contrivance closely resembling the oyster-tongs employed for taking oysters from their breeding grounds.

One day, after enjoying a bath in the swimming-pool, when the captain and Hiram were both present, they took a sun-bath. While wading through the shallow waters near the shores of the smaller lagoon, the captain called their attention to what at first appeared to be a species of china aster. It was, however, as they well knew, the head of some form of radiate, the petals being the bright-colored tentacles of the animal.

"Look at that," said the captain to Hiram and the boys, "there is something the Chinese are so fond of as a food that they are willing to pay for it prices sometimes as high as three hundred to five hundred dollars a ton."

Hiram, attracted by the statement that the animal was good to eat, apparently recognized it, for he at once began poking the sand in the neighborhood of the head with a stick of wood he was carrying, and at last held up before them, slung over a stick, an animal closely resembling a huge snail or slug. It was about four inches in diameter and a foot and a half in length, and was furnished with a row of small projections like teeth along opposite sides of a body of a slaty gray color.

The animal was so jellylike in its consistency that, as it hung on the stick, its weight caused it to considerably increase in length and decrease in diameter. Its body

was fairly transparent, so that they could see that it was filled with water and sand.

Altogether it was a most repulsive-looking object as it hung squirming on the stick. No matter how well it might taste when properly prepared, it was certainly far from attractive in appearance.

"Do the Chinese eat that horrible-looking thing, Uncle Arthur?" cried Harold. "Why, it looks like a great dirty leech."

"Yes, Harold. Not only in China, but also in some other parts of the world, the animal is highly prized for the preparation of jellylike soups. Tell the boys what you know about it, Hiram," said the captain.

"The cap'n's right for sartin about the Chinese thinking thet animal is fit to eat. I've tasted the soup made from it, and I'm free to say I don't like it at all. P'raps, howsumever, my taste ain't bin cultivated enough." And then he added, as an additional piece of information: "This here animal is sometimes called a cowcumber (he meant cucumber) on account of its shape when dried."

"Please tell us something about the animal, captain?" asked Jack.

"The sea-snail or slug, as the animal is called, is a variety of mollusk that forms one of the most important commercial products of this part of the world," replied the captain. "The animal lives on sandy bottoms in the shallow waters of lagoons. It possesses the power of crawling over the sand, but this motion is so slow that it can only be detected by carefully noting the

position of the animal from time to time. It apparently spends most of its life drawing in sand and water at one end of its body and spurting it out at the opposite end. It is called the trepang by the Chinese, but its common name is the sea-snail or the bêche-de-mer. It occurs in different varieties, the gray, the red, the black, and the spotted.

"The animal Hiram has just taken from the sand is the gray variety. The red, the smallest and least valuable, is found generally on the edge of the coral reef where the surf breaks over it. The spotted variety which attains a much greater size than the red, is sometimes called the leopard bêche-de-mer on account of its olive-green spots surrounded by orange-colored rings. The black bêche-de-mer lives on shallow and clean sandy bottoms at depths varying from knee-deep or a depth of ten fathoms. The black variety is sometimes as thick as a man's leg, and has a length of two and a half feet. Its color is a smooth jet black, not unlike enameled leather. The under side of the belly is of a bluish-slate color.

"All these varieties of sea-slugs are harmless except the leopard or spotted variety. If you ever meet with a spotted or leopard sea-slug be careful how you handle or go near it. When angered it possesses the power of vomiting or throwing out a great quantity of slender filaments somewhat resembling pieces of white cotton lamp-wick. These filaments are of a jellylike consistency, and are able to cling to the human body like glue. As soon as they touch the skin they begin to

burn it like a blister, thus setting up a painful inflammation. If one is so unfortunate as to get a drop of the liquid in the eye it will instantly set up so violent an inflammation that one might think it due to a red-hot coal. Indeed, there are instances where the sight has nearly been lost in this manner."

"How is the sea-slug prepared for the market, captain?" inquired Jack.

"As soon as the animal is caught it is slit up its entire length on its under side by a sharp knife, the animal being held during this operation so that its intestines will fall into the sea.

"It is necessary that the animals shall be cooked as soon as possible after the boats reach the shore. If they remain piled together too long after their intestines have been removed they will lose their original form and cling together in a sticky glutinous mass that can never afterward be separated.

"The animals are prepared for curing by cooking in a hot stone oven, by boiling, or by subjecting them to the action of steam. As soon as cooked they are exposed to smoke in a manner similar to that employed for preparing smoked fish or meat.

"In cooking by the hot stone oven, a hole is dug in the ground in which a fire is built of small pieces of wood and cocoanut husks. Stones are heaped on the fire, and another layer of wood, cocoanut husks, and stones is added. As soon as the stones are thoroughly heated they are spread over the bottom of the hole, and the sea-slugs piled on them as close as they can

lie. They are then covered first with large green leaves, then with palm-leaf mattings, and finally with a layer of earth. After an hour's baking they are subjected to the smoking process. The time required for smoking varies from two to three days.

"At the end of the smoking the animals are greatly altered both in size and appearance. They are then no longer slimy, and resemble pieces of bacon rind. It is necessary to turn them at least once during the process.

"In the boiling the animals are at once thrown into boiling salt water in which they are kept several times for about ten minutes, being washed in fresh water each time they are taken out of the pot. While boiling is a much quicker way of preparing them for smoking than the hot stone oven, yet it possesses the disadvantage of requiring the smoking to be continued for at least eight days. Moreover, when thus prepared the material is more apt to be injured by exposure to damp air than by the other process.

"By the third method the animals are placed in a hogshead or other close box and subjected to the action of steam introduced by a pipe connected with a steam boiler. This is an excellent plan and is generally adopted when possible.

"The smoke-dried animals are packed in baskets of palm leaves that are not stitched together because, when shipped to great distances, it is necessary occasionally to open the baskets and spread the contents out in the

hot sun to dry thoroughly. This variety of food product is apt to spoil during a long voyage, and since China is the principal market, unless they have been carefully prepared and looked after during transit, they may spoil long before reaching their destination."

CHAPTER XVII

Stung by a Sea-nettle

Shortly after the discovery of the vegetable garden at Maddox Clearing they selected a suitable location for a kitchen garden near Jackson House where the soil was fairly deep. They then began to enrich and deepen this soil by admixture with additional soil formed by the decomposition of volcanic ashes. They obtained this not only from Maddox Clearing, but also from different parts of the island where, as they afterward discovered, the soil to some extent was volcanic in origin.

In the Jackson garden, sweet potatoes, beets, onions, and such herbs as thyme, sage, and parsley were planted. They also sowed some of the dried peas, lima beans, and white beans that formed a part of the stores taken from the derelict brig. These readily sprouted, and under the influence of abundant moisture, good soil, and a tropical sun, flourished wonderfully. A small part of the garden was devoted to the growth of sugar-cane and yams.

But what pleased them more than anything else was the discovery, among the many goods brought from the brig, of a few packages of the seeds of common garden flowers of England. Planting these in beds on the sides of Jackson House, they soon had morning-

glories, cypress, and clematis vines climbing to the top of the porches. Hollyhocks, verbenas, petunias, black-eyed susans, and geraniums also grew luxuriantly in beds near the house.

It was not their intention to raise vegetables in the Jackson garden for their regular food supplies, but only for occasional use. The depth and character of the soil at the Maddox Clearing were so much better than any they could readily collect at Jackson House, that they sensibly concluded it would be preferable to locate their principal vegetable garden at the Maddox Clearing. Consequently, they spent much of their time on Twin Island No. 1. After several weeks of hard work they put the clearing in excellent condition, and planted it with crops of the vegetables they had found growing in it.

Since Maddox Clearing was at some distance from Jackson House, they made arrangements that would permit them comfortably to spend the night at the clearing whenever they found it convenient to do so. They had, therefore, erected one of the portable houses there, similar to the house at Jackson Harbor, except that a single house only was built. This, which they agreed to call Maddox House, was comfortably fitted up with bedrooms, a sitting-room, and a kitchen, and front and side porches.

I hardly need tell my boy readers that Maddox House possessed an especial attraction to the three youngest members of the party. It was not far from the swimming-pool, so that after a few hours of hard work,

generally begun after breakfast during the cooler portion of the day, the boys would almost always repair to the swimming-pool where they soon forgot their fatigue, both by a good swim in the clear waters of the lagoon and the use of the polished limestone sliding-board, whenever their swimming hour occurred at or near high tide. Indeed, during any tide, by thoroughly wetting the limestone channel they were able to slide down its polished surface.

It will be remembered that shortly after the exploration of Twin Island No. 1, they had built a raft in its lagoon for convenience in going from one part to another. Finding the raft clumsy they afterward built a boat for use on this lagoon only. This boat was not only employed for the carriage of articles between different parts of the island, but was especially used by the boys, either in going to and from the swimming-pool, or during their excursions to different parts of the island. As already mentioned, the captain had appointed certain hours for daily work, both for the boys as well as for himself and Hiram, and although there was plenty of work required for the cultivation of the vegetable garden at Maddox Clearing, yet he had arranged matters so that there were always several hours each day after their studies at their disposal. These they spent either in the swimming-pool, in the boat, exploring different parts of either Harding Island, or in visiting some of the smaller islands of the lagoon. But it was in the boat that had been built for the lagoon of Twin Island No. 1 that the two younger boys spent

most of their time. Indeed, Charley and Harold used this boat so much that it had been christened "The Chums," and when the two younger boys were missing, which was such a common occurrence that it ceased to occasion surprise, they would, when looking for the youngsters, first see if the boat was in its mooring-place, and if not, would look for them somewhere on the lagoon.

One day Charley suggested to Harold that they should provide at the different landings a mail-box for holding a paper tablet and lead pencil, so that word could be left as to their whereabouts.

"It's what men do in their business offices," said Charley. "They put signs on the door, 'Back in five minutes,' or 'Back in three hours,' etc."

"It's a capital idea, Charley," said Harold laughing. "But we must try to make our signs more truthful. I have heard father and other gentlemen say that such signs in most cases are very unreliable."

"That won't do here," said Charley. "I wouldn't like to try it twice on the captain; would you, Harold?"

"You bet I wouldn't," was the reply; for Harold, although very fond of his uncle, nevertheless stood somewhat in awe of him whenever he had done anything that was either thoughtless or foolish.

"But then, Harold," said Charley, "we can put more than a few words on the cards. We can say, Gone to such and such a place. Back by dinner or by supper-time."

In order to be able to signal any of the boats, the captain had flag-poles erected at all the landings. The flags consisted of pieces of the colored blankets. A flag raised to the top of the pole meant the boat was at the landing, but when raised only to within ten feet of the top, or when alternately raised to the top and lowered, meant that some one was at the landing waiting for the boat.

They had now three boats in regular service on Harding Island; viz., Boat No. 23, in the waters of the ocean at Jackson Harbor. Boat No. 13, the one they had built on the island, for service in the waters of the larger lagoon; and The Chums, the boat last constructed, for use in the lagoon of Twin Island No. 1. All these boats had regular landings. For convenience, they agreed to call these landings, Landing No. No. 1, Landing No. 2, No. 3, No. 4, and No. 5.

Landing No. 1 was the landing for boat No. 23 on the waters of the ocean at Jackson Harbor. Landing No. 2 was situated on the lagoon of Harding Island, opposite Landing No. 1, and was employed for boat No. 13. Landing No. 3 was the regular landing for boat No. 13 at the western end of Twin Island No. 1. Landing No. 4 was the landing for The Chums in the waters of the Twin Island No. 1, immediately opposite Landing No. 3; while landing No. 5 was where The Chums had its regular landing-place at Maddox Clearing. Wherever necessary they had provided the landings with boardwalks for convenience of access.

Of course, there were other places where any of the

boats could be landed, but these five landings were where the boats were left when not in use. The post-boxes at the landings were placed along with the signaling masts. By looking at the position of the flags, therefore, they could tell at a distance whether a particular boat was in use and could, moreover, signal for it when absent.

The cultivation of Maddox garden necessitated both Hiram and the captain being frequently at Maddox House, where they often passed the night. There was present in the waters of the lagoon of Twin Island No. 1 a great variety of the different organisms capable of producing limestone. The captain took advantage of this to point out to the boys the principal animals and plants from which limestone rock is formed, and that would, therefore, permit the formation of coral islands. These belonged to four classes; namely, polyps, hydroids, bryozoans, and algæ or seaweeds. The first three were animals; the last plants. In this connection the captain gave them the following information:

"Polyps are by far the most important of the coral-making animals. From them nearly all the coral reefs of the world have been produced. Polyps (as already described in a preceding chapter) bear externally a close resemblance to such flowers as china asters or chrysanthemums. The flower-like appearance is limited to the top of an upright pedicel that is almost always fixed to the rocks at the bottom of the waters in which the animal is growing. When the animal is feeding,

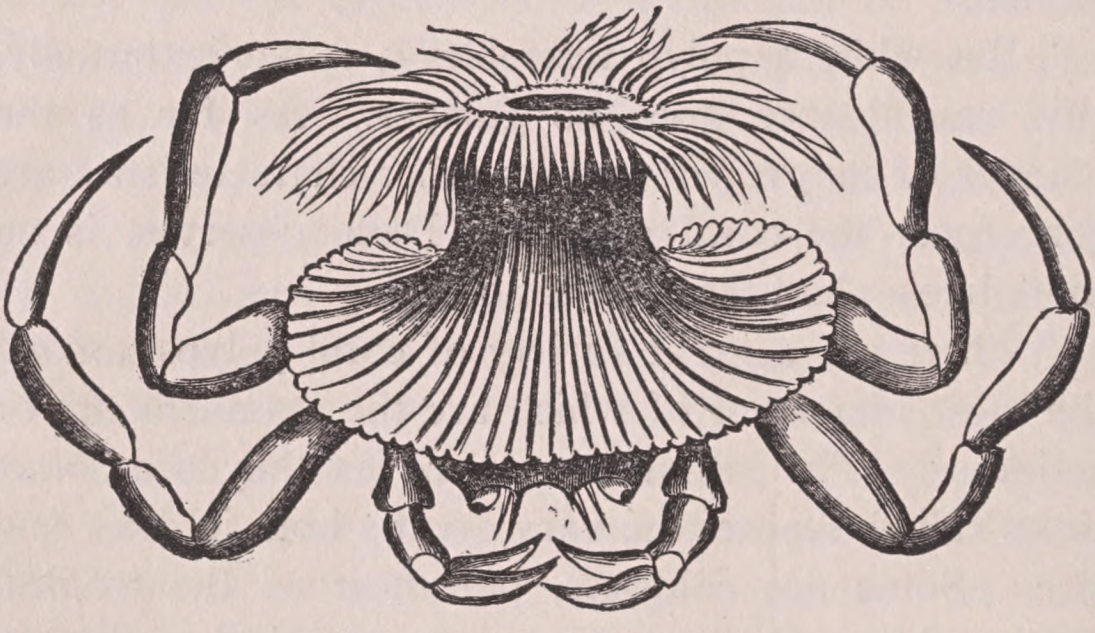
or not alarmed, its upper end has the shape of a disk surrounded by organs, resembling the petals of many flowers. These organs are called tentacles, and like the petals of a flower, are supported at the upper end of a cylinder which, unlike the slender stem of a flower, is often almost as broad as the disk of the flower-like part itself. At the center of the disk is an opening or mouth that leads to the stomach of the animal.

"But while a polyp resembles a flower externally, this resemblance goes no further. As far as the manner of its growth and its other characteristics are concerned, the coral polyp, as Dana observes, is no more like a plant than is a cat or a dog.

"There are a great variety of coral polyps, among the most important of which are the sea-anemones or actinoids. The sea-anemones, or as they are sometimes called, sea-nettles, vary greatly both in color and size. Some are colorless, but most of the tropical species have their tentacles or petal-like organs, brightly colored. The commoner colors are red, pink, blue, or bluish-green. The body is also colored. In some cases it is red, with spots of dark green; in others, is a bluish-green. Sea-anemones vary in diameter from an eighth of an inch or smaller to more than twelve inches. Dana describes a species, growing in the Paumotu Islands of the Pacific, that sometimes attains at its disk a diameter of fourteen inches. Generally speaking, sea-anemones are unable to move through the waters from place to place, the lower part of the

animal being attached at the bottom of the sea to shells or stones. There are, however, exceptions to this, as the following examples will show."

Harold had become greatly interested in coral polyps, especially of the actinia group, and spent much of his time watching them. One day, while engaged in this work, he called the captain who was in the neighborhood with Charley and Jack, exclaiming:



Sea-anemone on Back of Crab

"Uncle Arthur, come here quickly with the boys and look at this odd kind of sea-anemone. It's not fixed to the bottom like the others, but is walking sidewise in a queer crablike manner. Come quickly, before it runs away."

"Where is it, Harold?" said Charley.

"There," he answered, pointing to a sea-anemone that appeared to possess crab-shaped feet, that were making off with the animal in a curious though some-

what rapid side motion. "Look at that, uncle," he continued; "don't its feet look like the feet of a crab?"

"They certainly do, Harold," replied the captain, "and, moreover, they should, for they are the feet of a crab."

"Do you mean to tell me," exclaimed Harold, in great surprise, "that crab's feet are actually growing out of the body of an anemone!"

"Not at all," was the reply. "We are looking at two separate animals. The anemone has attached itself to the back of a crab and is being carried about by it as it moves through the water."

"Is the anemone eating the crab, captain?" inquired Jack.

"No," was the reply, "the animals appear to be quite friendly. This anemone, while quite young, attaches itself to a small shell that this species of crab is in the habit of holding over its back by means of its two hind legs. It remains on the back of the crab and, growing, gradually spreads itself over the crab's back, thus taking the place of the shell."

By watching this curious specimen, they could see that both crab and anemone appeared to be in vigorous health.

"Is it unusual, captain," Jack inquired, "for anemones to grow on the backs of animals like the crab?"

"I believe not," was the reply. "I understand that this species of anemone and crab generally live together in their strange partnership, and are never seen apart.

I understand too, that there are other species of anemones that acquire a similar power of moving from place to place by attaching themselves to the shells of mollusks that have since been inhabited by soldier or hermit crabs."

"I have seen hermit crabs, captain," said Charley. "They are funny animals. Instead of making shells for themselves, they hunt up an empty shell and live in it until, growing too large, they again go house-hunting until they can find a larger empty shell which they enter after throwing away their old house."

"Do they move often, Charley?" inquired Harold.

"I suppose they must, Harold," was the reply. "You see, if they grow very fast the old shell would soon become too small for them."

"What would happen to such a crab if it got too large for his old house and was unable to find another big enough for him, Uncle Arthur?" inquired Harold.

"It would soon wretchedly die, Harold," said the captain; "for, having failed to form or build its shell as nature intended it should, it has lazily protected itself with the shell of a dead mollusk. When, therefore, forced by increased growth to leave this shell, it fails to find another it is unprotected and becomes an easy prey to its enemies."

"Captain," inquired Jack, "are not all of us apt to lose the use of portions of our bodies if we fail to use them?"

"Yes, Jack," was the reply. "Do you remember the selection from the Bible we were reading last week

before retiring?" (For the captain always read a chapter from the Bible to the boys before going to bed.) "'For whosoever hath, to him shall be given, and he shall have more abundantly; but whosoever hath not, from him shall be taken away, even that he hath.' This means that God will permit us to continue to use only such parts of the body as we keep in use. If we fail to use an arm or a leg that has been injured it will gradually become so atrophied or withered that it can never be used again."

"Look out, Harold," said Charley, "if you don't use your tongue more frequently by asking qustions it may become dried up or may waste away so that you can never talk again. What's the word, captain, please?"

"Atrophied," was the reply, "but I don't think there is much danger of Harold's tongue becoming atrophied. Do you, Harold?" he asked in a jollying tone. For Harold, like many young boys, kept his tongue in almost constant use when he was awake; and indeed even when asleep, as Charley, who slept with him, declared, he was not entirely quiet, but often talked.

"I guess not," replied Harold laughing.

It would be interesting, if time permitted, to give in full the descriptions the captain gave of the other forms of coral-making animals. Briefly, however, they were as follows:

The hydroids are a form of animal related to the hydra of fresh water. Hydroids possess the form of polyps, but are provided with much longer tentacles.

These animals receive the name of hydra from the fabled Hydra of mythology—an animal, it was claimed, that grew two heads for every head that was cut off, a property that rendered the killing of the animal perplexing to its enemies, since the more they attempted to kill it by cutting off its heads, the more alive it became. So it is with the hydroids. If these animals are chopped into small pieces the separate pieces grow, and in a short time develop a perfect animal, head, body, tail, etc., complete. The hydra were at one time believed to be polyps, but are now known to be embryonic forms of jellyfish before they attain their adult or full growth.

"That's a funny kind of animal, Uncle Arthur," exclaimed Harold; "it seems hard to kill."

"Oh, I don't know," said Charley laughing, "if you can't kill it by chopping it into pieces, turn it inside out, so as to bring its stomach on the outside. I guess that would fix it; wouldn't it, captain?"

"No, Charley," replied the captain, "such an experiment has actually been tried, but so far from killing the animal the old stomach becomes an outside, and the old outside becomes a stomach."

Continuing his description of other forms of organisms capable of producing materials for beds of limestone, the captain told them about the bryozoans, a species of animal that took this name from their branching mosslike forms.

The bryozoans are the lowest of the mollusks. Externally, they resemble a polyp, in having a circle of

slender tentacles around the mouth. The internal structure, however, below the head is that of a mollusk. The bryozoans generally form thin crusts of lime on seaweeds, rocks, or other supports, or they produce slender mosslike tufts of thin curved plates resembling filaments of moss. Sometimes, however, they accumulate large masses of limestone formed by growing plates over plates.

The fourth class of coral-making organisms, the algæ or seaweeds, are plants. They are sometimes called nullipores. Although true algæ or seaweeds, yet they produce stony encrustations that cover the surfaces of dead coral or coral rock in forms resembling lichens. These encrustations closely resemble some forms of coral but differ from them in the absence of cells or pin punctures in their masses.

While talking about the sea-anemones, one of the boys inquired of the captain whether any of these animals were able to protect themselves from their enemies. The captain informed them that the anemones possessed both a defensive as well as an offensive means for protection; that when alarmed they would sometimes expel large quantities of water from the mouth, draw in their tentacles, causing them to disappear, and at the same time contract or shrink into a much smaller space. That they possessed offensive means for protection, Harold learned shortly afterward by painful experience.

One day while, with the exception of Hiram, they were all in the swimming-pool, Harold and Charley

had left them for a while and, without dressing, had waded along the bank of the smaller lagoon. On leaving the water, Harold had taken a penknife out of the pocket of his jacket, from where it was lying in the sand, and was cutting a boat from a piece of cork. They stopped for a moment to examine two large sea-anemones with deep red tentacles. The anemones were in a portion of the lagoon where there were no other animals, and were fixed to the bottom close to each other. While examining them, Harold's knife fell out of his hand into the water directly between the two animals. Unwilling to lose it, Harold started to dive into the water. Seeing what he was about to do, Charley cried excitedly:

"Don't dive in there, Harold! Should you touch the sea-anemones you will almost certainly get stung by them, and as they are large you might be greatly injured."

"But, Charley," was the reply, "I can't afford to lose that penknife. I guess I'll risk being stung." He then very foolishly dove into the deep water, planning to reach the knife by afterward cautiously approaching the place it had fallen. Slowly creeping along the bottom until he got near the sea-nettles, he thrust one arm between them and held on to the bottom with the other hand. Suddenly losing his hold on the bottom, he was thrust upward by the buoyancy of the water, so that his arm brushed the tentacles of the two sea-nettles. The frightened animals instantly wrapped their tentacles around a portion of his arm between the

wrist and the elbow, and stinging him, produced such intense pain that he was rendered unconscious and fell into the deep water, fortunately away from the animals. Indeed, had not Charley been present, he would probably have been drowned; for he remained unconscious for some time. Charley instantly diving into the deep water picked him up from the bottom and soon had him lying on the sand. Leaving him here, Charley ran rapidly toward the captain and Jack, who had come out of the water and had just finished dressing themselves.

"Help! Help!" cried Charley. "Harold has been stung by two big sea-anemones and is lying unconscious on the beach."

Running to Harold they were pleased to find he had regained consciousness. As soon as he saw the captain, he cried, pointing to his arm:

"Uncle Arthur, I have been stung by two sea-nettles. The pain is something awful. Can you do anything to take it away?"

"Let me see your arm, Harold," was the reply.

More than three-fourths of the arm between the wrist and the elbow, that had come in contact with the angry sea-nettles, showed an intense inflammation, and had already commenced to swell.

"How did it happen, Charley?" the captain asked.

"Harold's penknife fell in the water between the two large sea-nettles. I tried to keep him from diving in to get it, but could not do so. While trying to pick the knife up he lost his hold on the bottom. As he

was pushed up by the water his arm brushed past the animals, when they stung him as you see."

The pain was so great that Harold, though a brave little fellow, could hardly keep from crying. Turning to Jack and Charley, the captain said:

"Run to the boat both of you. Charley, bring me some of the birds' eggs we collected this morning. Jack, row the boat here as quickly as you can."

Charley soon returned with the eggs. The captain rapidly covered the inflamed part with the whites of the eggs, which appeared to give Harold considerable relief.

Jack soon arrived with the boat, when Harold attempted to rise and get into it, but the shock had been so great that he was too weak to walk, so they carried him to the boat, and rowing rapidly to Maddox House put him in bed, where, carefully washing the eggs off the wounded part, covered it with sweet oil. This appeared to greatly relieve him, when, the captain giving him a sedative from the medicine chest, he soon fell into a troubled sleep.

The inflammation caused by the stings of the sea-nettles was so severe that Harold was obliged to remain in bed for several days. When he became convalescent, he was naturally desirous of learning more as to how these animals are able to protect themselves from any enemy that might attack them.

"Uncle Arthur," he inquired, "when the tentacles of the nettles closed on my arm, I felt as though it was grasped by red-hot fingers. Immediately afterward

I felt a burning pain as though the animals were squirting poison. Can the animals do this?"

"Yes, Harold," was the reply. "They are provided for their protection with dangerous concealed weapons like little darts or spears, which they threw out from their bodies with such force that they entered the flesh of your arm. These darts are called by Agassiz, 'lasso-cells,' from the small cell-shaped sheaths in which they are coiled, and from which they are shot out, as he says, 'with lightning-like rapidity.' As soon as the cells enter the body they are followed by an injection of poison, probably like the highly acid material that is secreted by hornets, wasps, bees, etc."

"Then, uncle, these darts or lasso-cells are still sticking in my arm, are they?"

"Yes, Harold," was the reply.

"How long are they?" inquired Harold, who was naturally very much interested in them.

"Oh, quite short," replied the captain, "so short, indeed, that you could put two hundred of them end to end in the space of an inch."

"I don't care, they can sting all right," replied Harold. "Or, at least, the cells can together with the acid substance afterward squirted into the wounds. They knocked me senseless, and if Charley had not been on hand I might have been drowned."

"Then, Harold," said the captain, "you can understand that if a sea-anemone or other polyp should give a small animal a full stroke it would almost instantly kill it."

CHAPTER XVIII

The Sea Grotto at Parker Cliffs

Although Harold's arm was so badly stung by the sea-nettles that he was obliged to remain in bed for several days, yet the inflammation disappeared more rapidly than it would have done had not the lad been in such a general healthy condition. Indeed, he was soon up, around, and as active as usual, and this is saying no little; for the lad was so brimful of physical energy that while awake he was scarcely ever at rest.

After several weeks of hard work, the vegetable garden at Maddox Clearing had been placed in good condition. During most of this time they all slept at Maddox House. But now that the work at the clearing had progressed so far they again settled down at Jackson House, which was not only larger and more convenient than the house at the clearing, but also gave them a view of the ocean. Should, therefore, a passing ship be seen they could set fire to a pile of wood, cocoanut husks, and other inflammable materials they had piled together for a signal when needed. Besides this, they had also rigged up a mast and rope on the top of the tallest palm tree on Parker Cliffs with a flag for a signal by day and an arrangement for hoisting a bengola light for a signal by night. Moreover,

Hiram had mounted the bronze cannon in front of the porch at Jackson House so as to be able to fire minute guns should a ship approach the island.

They had now plenty of spare time. This was especially the case with the boys; for their regular duties did not generally require more than an hour or two at the most, and with the exception of those days when there was work to do in the kitchen garden at Jackson House, or in the garden at Maddox Clearing, they had plenty of time for exploring the different parts of the large lagoon, as well as its four islands.

It must not be supposed that the captain permitted the boys to spend all their time in this manner. A portion of each day, excepting when the captain had given them a whole holiday, was devoted to reading or keeping up their school studies. The captain was an admirable teacher, and was too sensible to permit the boys to give up their studies entirely.

The boys generally enjoyed these whole or nearly whole holidays in boat No. 13 on the Harding Lagoon, or in The Chums, on the lagoon of Twin Island No. 1. Jack sometimes accompanied them in these excursions, though frequently he spent the day with the captain, for whom he was acting as an amanuensis; for the captain was editing, as well as adding to, the manuscript of " The Physical Geography of the Sea," before referred to. Jack was happy to do this work, not only because he was becoming more and more attached to the captain, but also because the work gave him an opportunity for becoming better acquainted with the

animals, plants, and natural phenomena of the oceanic islands of the Pacific, as well as of the ocean itself.

One morning, after the boys had completed their work, on an occasion when the entire balance of the day was to be their own, they had planned to spend the time on the large lagoon in boat No. 13. When about ready to leave, they turned to Jack and said:

"Won't you come with us, Jack? We're going to have a splendid time fishing, swimming, and exploring."

"I think not," said Jack. "I promised to help the captain in his work on the book."

"Boys," said the captain, as they were getting ready to leave, "don't forget you are to weed the onion bed at Maddox Clearing to-morrow. As it is very hot in the middle of the day, you had better get to work early in the morning. It will pay you to get your work done early to-morrow, so you can start soon after breakfast."

"Boys," said Jack, "I'll do all your work around the house to-morrow morning, so you can take an early breakfast and reach the clearing in the cool of the morning."

"That's jolly good of you, Jack," said the boys.

"Then," said the captain, "if that's so, how would you like to spend the night at Maddox House, get your work done, and so have all the rest of to-morrow to yourselves?"

"That would be great, Harold, wouldn't it?" cried Charley. "We'll stay all night, won't we, Harold?"

"Are you sure you're not afraid, Harold?" inquired the captain in a joking tone.

"Why, of course, I'm not afraid, Uncle Arthur," replied the lad in a reproachful tone.

"Captain," said Charley, "you don't care when we do the weeding, do you? We might arrange to do it to-day in the cool part of the evening, and this would give us all to-morrow to ourselves."

"I don't care when you do it, boys," said the captain. "If I think you manly enough to remain at the clearing all night I can surely trust you to do your work intelligently. Of course, you won't work during the greatest heat of the day. But," he continued, "if you are going to stay over night you had better take some extra food with you. Jack," he continued, "tell Hiram the boys are going to stay all night at Maddox Clearing and would like some extra food put in the boat."

In a short time Hiram and Jack returned with the food supplies. In addition to these, however, Hiram was carrying in one hand a new spade that he had obtained from among the stores of the wrecked brig.

"Take this spade to the clearing, my lads. I'll need it next week for digging a bed for beets. Look out it don't cut ye. I hev ground the edge a'most ez sharp ez a cutlass. I'll store it for'd where it'll be out of the way. I say, my lads," he continued in a surprised tone, "wot's this here contrivance," pointing to a formidable looking weapon consisting of a large bayonet-knife fixed firmly but ingeniously at the end of one of the hickory hoe-handles that had been shipped with

agricultural hardware as part of the cargo of the derelict brig.

"Harold and I rigged it up. We are going to spear fish in the lagoon with it," replied Charley.

Both the captain and Hiram smiled at Charley's remarks. Hiram picked up the weapon and, handing it to the captain, said:

"It's a good piece of work fer lads ez young ez these. Thet thar bayonet'll hold to the end of the handle all right. I don't think I could hev fixed it tighter myself. If ye strike any animal with thet, my lads, ye kin make up yer minds it'll hold all right."

"Yes," said the captain laughing, "if they strike anything."

"Well, good-bye, boys," he continued, as they now pulled off, "we won't look for you until to-morrow, late in the afternoon. Have a good time, and don't forget I am trusting you to take care of yourselves."

The boat moved rapidly across the lagoon toward Twin Island No. 1. They were soon busy in planning how to spend the unexpected extra holiday they were to have on the morrow, as soon as they finished their work at the clearing.

"Harold," said Charley, "I've been thinking of that stone oven the captain told us about that is employed for cooking sea-slugs before they are smoked. Let's go straight to Maddox Clearing, build a stone oven and, after getting the stones hot, put in a yam. It'll taste bully when roasted. When we get the yam in the oven and the oven shut, we'll let it take care of itself

and have a good swim in the pool and a walk on the beach. When we return to Maddox House we ought to find the yam roasted just right for eating."

"That'll be fun," cried Harold, "and what will we do then. Can't we arrange our work so as to get all to-morrow to ourselves?"

"That's just what I've been thinking about," exclaimed Charley. "We'll get an early supper and work on the onion bed in the cool of the evening. Then we can spend all to-morrow in boat No. 13 on the Harding Lagoon. We have never thoroughly examined the lagoon side of Parker Cliffs."

Charley's proposal met with Harold's entire approval, not only because it came from Charley to whom Harold was greatly attached, but especially because there was something so attractive in the idea not only of building the stone oven, but also of carefully examining part of the island that none of their party had so far thoroughly explored. Therefore, as soon as they reached Maddox House they dug a hole for the oven, started a fire with wood and small pieces of cocoanut husks, and making alternate layers of hard bits of limestone, wood, and cocoanut husks soon had the stones quite hot. Then wrapping a good-sized yam in several layers of cocoanut leaves, and covering it with a layer of leaves, they covered the leaves with a layer of soil and left the heat in the stones to do the rest.

"Now," said Charley, "if everything goes right, that yam will be baked all right when we come back. I

say, Harold," he continued, "people don't have to starve on an island like this, do they?"

"No," said Harold, "I guess, Charley, you and I could manage to get along even if we were here on the island all by ourselves. Of course," he continued, "I wouldn't like to be alone. I'm glad enough to have Captain Harding, Hiram, and Jack with us."

After a pleasant swim they rowed the boat over the lagoon looking through the clear waters at such portions of the bottom as were in sight. On several occasions they saw large fish resting almost motionless on the bottom of the lagoon, and tried several times to strike them with the bayonet-pointed spear. It would have worked all right, as Charley explained, if it had only been long enough. But the end of the spear did not reach the fish below by ten feet or more. The clear waters caused the lagoon to appear much shallower than it actually was, so they put the harpoon in the bottom of the boat, remarking philosophically:

"We'll use it in shallower water and may then have better luck."

On their return to the stone oven they found the yam splendidly baked, and greatly enjoyed eating the sweet, mealy substance. Of course they had other things for supper, but this tasted best because they had prepared it. I have seen boys camping out, smacking their lips over the burnt and almost raw white potatoes they had cooked in a fire, and were so horribly prepared that had they been brought to their tables at home they would have turned up their noses in

disgust. But then they had cooked them, and that in their estimation made things all right.

I don't wish it to be understood that the yam was badly cooked. Indeed, it had been cooked splendidly. They had prepared the stone oven in accordance with the captain's directions, so that when they covered it up and left it alone, it had to cook all right, since they were not present to take it out of the fire every now and then and otherwise prevent its proper cooking.

Rompey, who was of course with the boys, not only greatly enjoyed the swim and the excursion in the boat, but especially expressed his entire approval of the yam and the manner in which it had been prepared. Indeed, the roasted yam was so great a success that they placed another yam in the boat, determining to build another oven sometime early next day, when they would start a fire so as to have it properly cooked on their return.

You may possibly ask whether such young boys as Charley and Harold would not be timid about spending the night alone in a house so far from their companions. But I am glad to say that both of them were sensible, manly boys, who were abundantly able to take care of themselves and, therefore, never thought of such a thing as being afraid of spending the night alone.

Shortly after supper they began the weeding of the onion bed, and completed it in about two hours.

As they sat talking before bedtime on the porch of the Maddox House, with Rompey lying at their feet,

Charley read aloud a chapter from the Bible. Shortly after this they went to sleep and did not awake until early next morning. Indeed, they were so little afraid that they never even thought of keeping watch.

As planned, they started early next morning for the large lagoon. Leaving The Chums at the No. 4 landing, they ran the flag to the top of the mast, thus showing that the boat was at this landing, and going to boat No. 13, on the lagoon, they pulled down the signal, thus indicating that the boat was out, and began rowing to the northwest shore of Parker Cliffs. The tide had been running out, and was then near its lowest point, so that there was no danger in making an examination of this part of the coast.

"By the time we reach the shore," said Charley, "the tide should be running in, so that we can safely examine the shore of the cliffs, even if we might chance to get near the opening through which the ocean communicates with the lagoon."

"Charley," said Harold, "I hope we'll discover what will interest the captain, Hiram, and Jack."

"So do I," said Charley; "and, somehow or other, I think we shall."

The boat was now several miles northeast from Twin Island No. 1, when Charley cried to Harold:

"See here, Harold, how stupid we've been. We've forgotten to leave the spade at Maddox Clearing. Shall we go back?"

"Oh, no," said Harold, "we can leave it there on our return. It's not in the way here."

As before stated, on the shores of the lagoon, immediately opposite the southern part of Parker Cliffs, the land ran in a steep incline down to the waters of the lagoon, but as they proceeded further to the south-east, it rose in the precipitous cliffs they had already visited with their other companions.

There ought to be caves and grottoes here as on the other side, Charley," said Harold.

" We're almost certain to find them," replied Charley. Don't you remember the captain saying that all the limestone in this part of the island was more or less eaten away either by the rain-water or by the ocean water? "

As the boat moved through the deep waters near the cliffs they saw the same deep flutings, or furrowings, in the vertical walls where the water had poured down them, as well as places where the waves had burrowed deeply into their base.

" I say, Charley," remarked Harold, " wouldn't it be jolly if we could find a cave or grotto in the face of the cliffs large enough for the boat to enter? "

" It would be great," replied Charley, " for then we could hide the boat."

" Why should we want to hide the boat? " inquired Harold. " There's no one on the island to hide it from."

" I was thinking," was the reply, " that we might hide it should another war-canoe visit Harding Island as was told about in the letter we found in the box alongside the skeleton."

"Oh, I forgot all about that," replied Harold. "But we haven't found the grotto yet."

"I'm not sure. What do you call that!" cried Charley, pointing to an opening in the side of the cliff wide enough to permit the boat to enter provided they bent their heads low in the boat.

"Shall we go in, Charley?" inquired Harold.

"I'd like to," was the reply. "But let's first see in what direction the water is running. This place is not much more than half a mile from the underground passage connecting the waters of the ocean with those of the lagoon. If the water is running into that opening it would probably be easier to get in than to get out."

"It's not running either way, Charley," replied Harold. "See that chip of wood there," pointing to a piece of wood that was floating in the water at the opening.

"That's so," replied Charley. "Let's go in; it'll be safe; it's slack water now."

The water at the opening was very deep. The width of the opening was fully thirty feet. Rowing the boat directly toward it and bending their heads, so as not to touch the top, they soon had the boat inside a cavern or grotto, the height of the roof of which so rapidly increased that it rose fully fifty feet above their heads, and even then they could see in the dim light that it was apparently much higher in parts farther from the entrance.

"Shall we take the boat farther in?" asked Harold.

"Yes, let's go in a little farther," was the reply.

They found the water deep for a distance of thirty feet from the entrance of the grotto. From this point it rapidly shallowed, so that the boat soon grated on the banks of a fine white coral sand and stopped on the right-hand side of the entrance. The water extended fully sixty feet inside the cavern. It did not, however, by any means reach the walls of the precipice at this point, for the grotto was apparently of great dimensions, and extended an unknown distance in the direction opposite to the opening. All they could see in this direction, however, was a blackness almost as great as that of a starless night.

"We have made a great discovery," exclaimed Charley. "Let's moor the boat here and explore the grotto."

"All right, Charley," said Harold. "This is a big cavern, and we ought to be able to tell the others all about it when we return. Suppose we get the candles and some other things from the boat and climb the path here that leads upward."

While they were doing this, Rompey, who had run along the side of the water toward the entrance began to show great uneasiness, every now and then barking and growling, as if he had seen something he did not like.

Knowing the intelligence of the dog the boys turned toward the entrance, waiting to see what conclusion Rompey came to.

"We don't know what it may be," said Charley. "Take this, Harold," handing him the bayonet-spear,

"and I'll take this," he said, seizing the sharpened spade.

But it was evidently a false alarm, for Rompey, after continuing to growl for a few moments, came back shaking his tail as much as to say:

"I guess I was wrong. I thought there was something in the deep water there, but I've changed my mind," so the boys stood looking at the opening.

"Is it not beautiful!" said Harold. "We might almost think we have discovered the palace of one of the genii of the ocean."

CHAPTER XIX

Cut off by the Tide. Battle with a Giant Squid

It was, indeed, a beautiful sight the boys saw as they stood facing the entrance to the grotto, on a gently sloping bank a few hundred feet from the boat. Outside they could see the deep blue waters of the lagoon sparkling in the sunlight, while inside, near the entrance, the nearer waters partially flooded that portion of the grotto with a pale, bluish light. Stalactites of pure white limestone hung in graceful pendants from the roof. Those nearest the opening were illumined by the pure white light of the sun, while those back of them, lighted only by the blue light emitted by the deep waters, flung back a light resembling in color that of a clear sky. Near their feet lay the boat, gently rocking from side to side over what, in the full light of day would have been a snow-white beach of coral sand, but in the dim light of that portion of the grotto was of a wonderful blue.

As their eyes became accustomed to the faint light, they could see that the grotto was larger than they had at first supposed. The roof increased rapidly in height from the immediate neighborhood of the entrance, and was decorated with magnificent pendants, or stalactites, of white limestone, that in all parts, except immediately over the water, had either formed stalagmites below

them or, in places, had joined the stalagmites and reared up pillars which supported the roof of the cave above.

Near the entrance the nearly vertical walls were covered with stalactitic columns that, like those seen in the grotto on the opposite side of the cliffs, closely resembled the pipes of a huge organ. Here, however, instead of a single organ only, there was a series of grand organs arranged one after another on the walls. The ceiling in front of the organs was ornamented by stalactites, while immediately below were stalagmites of fantastic shapes that required no flight of the imagination to cause them closely to resemble pulpits, reading desks, or seats for the vested choirs of some huge cathedral. Indeed, the play of colors on these masses of limestone varying, as it did, from a pure white in the immediate neighborhood of the entrance to blues that varied from pale tints near the entrance to nearly indigoes in the dim distance, might have made them think that the entrance was a huge stained-glass window composed of both transparent and blue glasses of different shades.

"What do you think of this for a sea grotto, Harold?" exclaimed Charley.

"It's all right," was the reply. "Wouldn't this be a bully place to hide in if the island is ever visited by savages. We could run the boat in here and hide in parts of this big cave where they could never begin to find us."

"It's a splendid place, Harold," said Charley, "but

one can only get in here at low tide. We must be sure to get out before the tide rises, or we mightn't be able to escape."

"Do you think the tide rises high enough to cover the entrance, Charley?" inquired Harold.

"I'm sure of it," was the reply. "I noticed, when we came in, that the water-mark on the sides of the cliff reached some little distance above the top of the opening."

"But there'll be time enough to make an examination, won't there?" exclaimed Harold.

"Oh, yes," replied Charley, "there will be nearly six hours before the high tide closes the entrance. We can easily get out of the grotto if we reach the entrance three hours from now; but, to be sure, suppose we call it two hours. If we are back in two hours, we'll be all right."

"Then let's start," said Harold. "In two hours we ought to be able to find out much about the grotto."

"Very well," replied Charley; "but wait a moment until I go down to the boat. Come with me."

"What do you want to get?" inquired Harold.

"A box of matches and a half-dozen candles for each of us. There are lots of both in the boat. Then we want to put on our heads the contrivances we rigged up the other day to hold the lighted candles, just as the miners do in the coal mines." So they placed the contrivances on their heads and lighted the candles.

"Now, let's get off," said Harold, anxious to see the grotto.

"Wait a moment," said Charley, going back to the boat.

"What are you getting now?" inquired Harold.

"Something to eat," was the reply; "we may be hungry before we get back."

"What, hungry in two hours!" exclaimed Harold. "Are you not forgetting that we expect to get back in about two hours from now?"

"It won't hurt to have the food," replied Charley; "we might be longer than we expect, and then you'll be glad I brought it."

While this was going on, Rompey, who had wandered down to the shore of the water nearest the entrance again began to growl, as though he smelled or saw something he did not like.

"I wonder what worries Rompey, Harold?" inquired Charley.

"Oh, I guess it's nothing," exclaimed Harold, anxious to get off.

"Come, let's go then; we're losing time."

Rompey had again apparently come to the conclusion that there was nothing in the deep water worth worrying about. He had come up with the boys, so they started off along a slope that led gently upward. Soon the steepness of the slope increased, but their candles lighted the slope ahead so well that they had no trouble in following it.

There was one circumstance that gave Charley no little anxiety, though Harold, less careful, apparently never thought about it. The grotto was so large that

they might have some difficulty in retracing their footsteps. Of course, there was no regular path, and the only way they had for distinguishing one part of the grotto from another was the peculiarities of the stalactites, the stalagmites, or the huge pillars that reached continuously from the ceiling to the floor. But there were so many of these that looked so wonderfully alike, that they could not rely on them as safe guide-posts.

"We must be careful not to lose our way," said Charley. "I wish I had brought my little pocket compass. There's no stream of water here as there was in the other cave to lead us back."

"Oh, I guess we can find our way back," said Harold, anxious to get on.

As they continued walking upward, they noticed that the darkness gradually decreased.

"We're coming toward another opening into the grotto," said Harold. "See, there's a spot of light directly ahead of us."

"Yes," said Charley, "and there's still another," pointing to a place where a few straggling rays of light entered through the roof. Walking rapidly toward the place where the light appeared immediately ahead, they were soon at a portion of the cave where, by crawling on their hands and knees, they were able to reach the outside at a portion of Parker Cliffs not far from the edge of a high precipice facing the lagoon. This place was so hidden by growing plants that it was almost impossible to see it from the outside. Fearing they might have some difficulty in finding

it again on their return, they took the precaution of not only carefully noting the appearance of the neighborhood, but also of raising a small monument of stones to mark the position of the entrance.

From this part of the cliffs they could get an excellent view of the greater part of Harding Island. Twin Island No. 1 could be distinctly seen a short distance on their left.

"And now let's try to find the opening in the roof of the grotto," suggested Charley. "We'll have to be careful we don't fall into it. The roof over that point seems to be so far from the bottom that I don't think a fellow would care much for anything after he had reached the cave from that opening.

After wandering around on top of the cliffs for some distance, both on the ocean and on the lagoon side, they at last found the opening, and after noting its exact location they returned to the point where they had left the cave. Sitting down here they took a few moments' rest.

"Although there is plenty of time, I think we had now better be getting back to the boat," said Charley. "We were only about half an hour reaching this opening, and we ought to be able to get back in less time; for, as you will remember, it's practically down hill all the way."

So, lighting their candles, they passed through the entrance and began to retrace their steps toward the boat.

Charley's estimate as to the time it would take to

regain the boat would have been all right had they been able to return there directly, but they found it very difficult to retrace their footsteps. Indeed, after walking for more than half an hour, they began to fear they had taken the wrong route. At last, when they reached a place where the path inclined upward, they felt sure that a mistake had been made.

"Harold, there's something wrong here," said Charley. "We're now walking upward, and we should still be walking downward. Don't you remember we climbed nearly all the way up from the opening to the top of the cliffs?"

"Yes," was the reply; "but I think we're going in the right general direction, don't you?"

"I'm not certain," said Charley, "but I think so too."

The light of the candles was sufficient before long to show that the surroundings were entirely different from anything they remembered having seen. Still under the belief that they were going toward the boat, they kept on until at last they reached a portion of the grotto where the roof was so low that they were obliged to stoop in order to pass through it, and suddenly reaching the opening at the far end, they both began to slide down a steep incline so rapidly that they were thrown off their feet. Fortunately, the length of the slope was short, and neither of them was injured.

It was now quite evident that they had lost their way and they began to worry, but not for fear they

could not locate their boat. This they firmly believed they would have no trouble in being able to do eventually. It was the thought of the coming high tide that worried them. Unless they soon reached the boat the rising tide would close the entrance. Therefore, they hurried along at a rapid rate, the path continuing to take them through portions of the grotto they were sure they had never seen before.

They kept this up for fully two hours from the place they had slid down the inclined portion of the roof. Feeling hungry they rested a while and began eating a part of the food Charley had brought with him from the boat, not forgetting to give Rompey his share.

"I'm glad you brought this food with you, Charley," replied Harold. "You've more sense about such things than I have. I can only see a little distance ahead, while you can see much farther."

While Harold was talking he was looking carefully around him.

"Charley," he said, "do you know I think I remember being in this part of the cave before. I'm certain I have seen that funny-shaped pillar before. I remember thinking how odd it looked, black at the top and bottom and snow-white in the middle."

"I'm afraid you're right, Harold," said Charley, "I think I remember seeing it myself. And now," he said, stooping to pick something up, "I know you're right. See what I found on the ground," pointing to a number of candles and a box of matches. "Look in your pockets and see if you have any there?"

"No," was the reply, after a short search, "they must have fallen out of my pocket when I slid down the path nearly two hours ago."

On looking around, they discovered that the place at which they had rested was at the foot of the very incline down which they slipped. It was evident, therefore, that during the last two hours they had wandered in a more or less circular path, so they were no nearer the boat than they had been two hours before.

"What shall we do, Charley? We're lost for sure, aren't we? It's no joke being lost in a place like this."

"We're lost all right," replied Charley. "There's no doubt about that, but don't get rattled. We'll be able to reach the boat; although, of course, we'll have to remain until the next low tide, for the entrance will be shut by the high water. But this need not worry us. There's plenty of air to breathe, and we have food enough to last for a day or more."

"In what direction shall we go, Charley?"

"I don't know," was the reply. "Look at Rompey, Harold, see how queerly he is acting."

The dog had been running restlessly about from place to place as if he was endeavoring to follow some scent. He had now come to his young masters and, looking into their faces, commenced shaking his tail and whining as if he saw they were in trouble.

"Let's get Rompey to lead us to the boat," said Charley. "He should be able to find our old tracks by his power of scent. Let's show him something from the boat and get him to lead us to it."

"That's a good idea, Charley," was the reply. "We ought to have done this long ago. Here is something I think Rompey will associate with the boat," saying this, he picked up a drinking-cup that was always kept in the boat, that they had taken along with them. Calling the dog to them and showing him the cup, Charley exclaimed:

"The boat, Rompey! The boat! Find the boat!" The dog looked at them intently for a few moments, as if in doubt as to what they wished him to do, but when they both repeated:

"Find the boat, Rompey! Find the boat!" he began to shake his tail in a way that showed that he understood, and after making wide circles all around them, at last ran in a direction almost directly opposite to that they had taken, stopping every now and then to look back and bark, as if to say:

"Follow me. This is the right way. I'll find the boat for you."

The boys followed him, for they felt sure he had scented their footsteps on leaving the boat. Indeed, in about half an hour, he led them to the boat.

"Hurrah, there's the boat!" cried Charley. "Good dog, Rompey, you found it all right, didn't you?" he said, and both boys began petting the animal.

Rompey was greatly pleased by the petting. On looking toward the entrance they found, as they expected, that the tide had risen. They were therefore shut in the grotto until the next low tide.

"Well," said Charley, "we can't get out, so let's

make the best of a bad bargain. Let's light up the grotto with the rest of the candles we have with us. There are more in the boat."

Placing eight candles in different parts of the grotto near the boat they lighted them.

The air was so still that the candles burned steadily, and gave a fairly good general illumination considering the comparatively small amount of light each emitted.

"Now let's go to the boat and get something to eat," said Harold.

As they walked toward the boat, Rompey ran ahead, but stopped when near the boat and began barking in a loud, angry manner.

"Look out, Charley," cried Harold. "I am sure Rompey sees something. Don't go near the boat until I bring you one of these things we left outside the boat when we came into the grotto."

So saying, Harold ran toward Charley with the spade in one hand and the bayonet-spear in the other.

"Take whichever of these you prefer," he continued.

"All right," said Charley; "I'll take the spade. If I strike anything with this it'll be no joke. Hiram has put an edge on it almost as sharp as a sword."

"Then I'll keep the bayonet-spear," said Harold. "I wonder what Rompey sees, Charley? Do you suppose there are any wild animals in the cave?"

"I don't know," replied Charley, "but I shall before long."

As the boys continued to approach the boat, Rom-

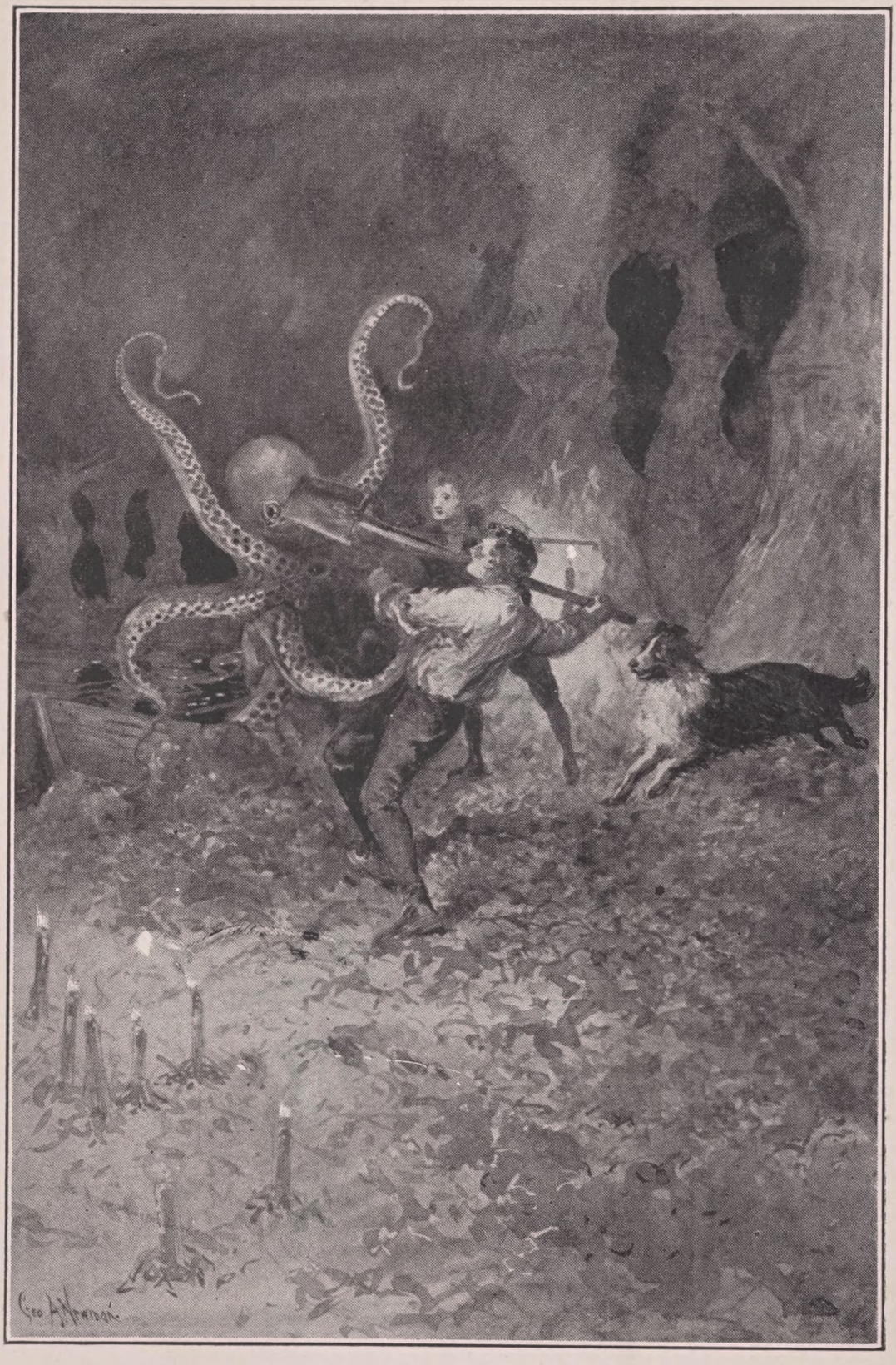
pey's barks became fiercer and fiercer. The intelligent animal seemed to be trying to tell them not to come nearer. Charley, however, continued to approach with Harold close after him. When they got nearer they could see a hideous-looking object, with a great rounded head nearly two feet in diameter, that reached above the top of the boat. It had two big eyes that were glaring at them in an angry manner.

When they first saw the animal it seemed as though it had more than a dozen arms, although, as they afterward discovered, there were only ten. It was waving these arms so rapidly that they seemed to be more numerous than they were.

"It's a devil-fish or squid," exclaimed Charley; "at least it looks like one, except that it has more arms than I thought such animals generally have. What horrible-looking eyes it has and how angrily it glares at us!"

"Look out, Charley, that it don't catch you with one of its arms. I remember Uncle Arthur telling me that the squid had things like suckers on the ends of its arms with which it can hold on to a man with a great force and, indeed, squeeze him so tightly as to kill him."

"I guess I'm safe off here," exclaimed Charley. "The arms are not long enough to reach me. Besides, as you can see, the animal has stopped waving its arms, and holding on to the side of the boat, is helping himself to the fish we put in the boat for bait. Look, Harold," he exclaimed excitedly, for the animal was using its arms or feet to rapidly pick up one fish after another, putting them into its mouth.



"Boldly facing the huge monster, he jabbed the spade in one of its eyes."

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" It must have been attracted to the boat by the smell of the fish," exclaimed Harold. " I guess it lives somewhere in the deep water near the entrance. It was this animal that made Rompey bark whenever he came near the mouth of the grotto."

But Charley's estimate as to the length of the animal's arms was proved to be inaccurate. Suddenly reaching out one arm, the animal seized Charley by his left arm, and at once began rapidly to draw him toward its mouth, with the evident intention of swallowing him alive.

It is fortunate that Charley did not lose his presence of mind. Although the grip on his arm began to increase so that he thought his arm was going to break, yet boldly facing the huge monster, he jabbed the spade in one of its eyes. The sharp weapon cut through the eye and entered the head a distance of several inches. When Charley drew out the spade, bloody matter, or something that passes for bloody matter, followed it. That the animal was weakened by the wound was evident from the grip on Charley's arm growing weaker; for, while when first caught he could only move his left arm to steady the spade, he was now able to use it more freely. Although greatly hampered, and still tightly grasped by the animal, he gave a number of jabs at the head; the animal, although greatly weakened, glared angrily at Charley with his remaining eye, and turning his head around so that he could see him better, suddenly grasped his right arm with another tentacle.

Anger seemed to give the animal fresh strength, for he again endeavored to draw Charley toward its mouth. As soon as Harold saw Charley's left arm caught by the tentacle of the fierce animal, without any hesitation, he boldly advanced striking it repeatedly in the head, and especially in the remaining eye.

The blood, or other liquid, was now flowing freely from the wounds in the animal, and it commenced threshing its free arms in the air as if endeavoring to touch what it could not see. At last, two of the arms caught Harold by the feet, and making apparently a supreme effort, again endeavored to draw both boys toward its mouth.

When Rompey saw the danger to which his two young masters were subjected, he sprang boldly at the animal, and began tearing it with his teeth, as well as with his claws. As the boys afterward remarked, they had always known that Rompey was a fighter, but the fierce manner in which he now bit with his teeth and clawed with his feet was something they would hardly have believed possible. But even Rompey's help would have been insufficient, for the boys were being drawn nearer and nearer to the mouth of the animal, though with less and less strength, for it was nearing its end. When Harold was near the animal, having his hands at liberty, he thrust his spear in the animal, running it through a part of its body with such force that it stuck into something that prevented him from drawing it out. Charley, who still managed to keep hold of the spade, crying to Harold, said:

"Take hold of the spade, Harold, and jab him with it."

Harold, securing the spade, succeeded in repeatedly striking the animal with it, until its huge head, severed from the body, fell over the side of the boat into the water. The animal was now in its death-throes. The arms attached to the boys relaxed and gave Harold the opportunity of cutting off by the spade the arms that were attached to Charley and himself. They did not however, fall off when the animal died; for, as they afterward saw, the arms were provided with sucker-like disks, capable of producing a partial vacuum beneath them, so that they were driven on them with the force of the atmospheric pressure, and therefore continued clinging to them after the animal was dead. Indeed, it was not until Harold had taken his penknife from his pocket and cut off the disks, one by one, that they were freed from the horrid arms that had been endeavoring to draw them to an awful death.

Now the animal was dead, they could see that it had only eight arms, or feet, together with two additional longer arms.

"I wonder if there are any more animals like this about here," exclaimed Harold.

"I shouldn't wonder if there were," replied Charley, "so don't get too near the water. There might be another one there ready to catch you, and I don't care to have another fight to-day; I've had as much as I want."

"Look at that, Charley," exclaimed Harold ex-

citedly. "See how the head of the monster that fell into the water is moving around. Is it possible we have not killed it?"

"We've killed it all right," replied Charley. "Look closer, Harold, and you will see there are five or six big sharks fighting for the head of the animal, as well as for the pieces of its arms or feet that have fallen in the water."

The sharks had come in through the entrance from the waters of the lagoon, and were feeding voraciously on the remains of the squid.

Seeing that there was no other squid near, and feeling sure that if there had been another it would have made its escape on the approach of the sharks, the boys got into the boat and threw the remaining parts of the animal into the water. They kept one of the longer arms, however, that was fully five feet in length, so as to be able to show it to the captain and the others on their return.

Althought it was now late in the afternoon, and they ought to have been quite hungry, yet they had no appetite. The disgusting odor that filled the close air of the grotto was enough in itself to deprive them of an appetite, even if their hands and bodies had not been covered by the material ejected by the dying squid.

"Let's get out of the boat, Harold," said Charley, "and sit on the beach above the water and wait until the tide runs down."

Leaving the boat, they sat patiently waiting for the ebbing of the tide, noting with delight the gradual fall

of the water from the time when a small beam of light came through the entrance until the opening was sufficient to permit them safely to take the boat out of the grotto.

"Come, Harold," cried Charley, "we can go now." And rowing the boat toward the opening they were soon in the waters of the outer lagoon.

CHAPTER XX

The Foundations of Parker Cliffs

The boat glided out of the grotto into the pure air and bright sunlight of the afternoon. They had been inside the greater part of the day and, therefore, greatly rejoiced at seeing the familiar objects around them. There was the entrance into the sea grotto. Near them too were the Twin Islands, and beyond them the smaller Kid Islands. The blue waters of the lagoon seemed clearer and more beautiful than ever before. There was too, a freshness about the air they never before remembered to have noticed. Nor was it difficult to find the reason; the chill, gloomy air of the grotto, although ordinarily pure and sweet, had become so contaminated with the matter given off by the dying squid that the outer air was sweet, bright, and warm by contrast. Then too, they had just passed through very great danger, for both knew that they had come very near being devoured by the animal.

"Ain't it pleasant to be outside again, Charley?" exclaimed Harold.

"You bet it is," was the reply. "The air is so clean and warm, and the light is so bright that it beats the grotto all hollow. And yet, Harold," he continued, "I am glad we found the grotto and have examined it, and have met with the squid and killed it."

"So am I," said Harold. "I understand that the squid is sometimes called the devil-fish, although Uncle Arthur told me that the devil-fish is really another animal. I think, however, we can say from experience that the name devil-fish would not be a bad one. Do you remember the awful eyes it had, and how terrible it looked when suddenly reaching out it grabbed you by the arms and me by the legs?"

"Yes," answered Charley, "and wasn't it dreadful when the animal drew us toward its huge mouth and tried to eat us alive? I imagine I see it now when, although we fought all we could, it kept drawing us nearer and nearer that awful opening."

"Yes," added Harold, "and had he not been seriously injured, it would have been impossible to prevent him eating us. And did not Rompey fight savagely for us. Had it not been for him I think it would have been all up with us. Good dog, Rompey," he added, petting the dog to his great delight. "How do your arms feel, Charley?" continued Harold.

"They feel as if they might be black and blue all over. I'm sure the awful creature squeezed them tight enough."

"That's the way my legs feel," said Harold.

"I'd like to take a swim and wash off; I feel awfully dirty, but the captain told us never to go in swimming in this part of the lagoon where there are sharks. Indeed, since sharks have been attracted here by the flesh of the squid, it would be both dangerous and

foolish to go in now. It is too late to go to the swimming-pool. Let's get back to Jackson House as soon as we can; it is getting late, and they will be anxious about us. But before we go we'd better take another look at the entrance. The captain will be sure to question us about it."

After a brief examination of the opening, they continued rowing the boat for half an hour, when Charley exclaimed:

"Suppose we rest a little, Harold. My arms hurt me so it is hard to continue rowing. I say, Harold, is there anything in the boat I can rub them with to take away some of the pain?"

"There's a bottle of witchhazel Hiram put in the boat to use for his rheumatism," said Harold. "I guess it would help you. Let me rub your arms with it."

Charley rolled up his shirt-sleeves. His arms—especially the left arm, which was first seized—were black and blue wherever the animal had gripped him, but after Harold rubbed him for eight or ten minutes he felt greatly relieved.

"Let me do the same for you," said Charley.

"I wish you would," said Harold, "for my legs hurt very much.

An application of the witchhazel so greatly relieved him that the boys, continuing to row, resting every now and then, reached the landing at Jackson House long after sunset. Here they found the captain, Hiram, and Jack anxiously waiting for them.

"Has anything happened, boys?" asked the captain. "We have all been greatly worried about you. We felt sure that unless something had happened you would not have remained away so long."

"We rowed the boat along the shore of the lagoon side of Parker Cliffs, not far from where the waters of the ocean communicate with those of the lagoon," said Charley.

"Yes," said Harold, "and we discovered a big cave in the cliff that I think is nearly opposite the cave we all examined on the side of the ocean."

"We wouldn't have gone on this side if it hadn't been low tide," added Charley. "We discovered an entrance to a sea grotto wide enough for several boats to get in, but so low that we had to bend our heads to enter."

In this way, one speaking after the other, the boys told the captain all that occurred, beginning, of course, with the discovery of the cave, its size, its connection with the cliffs above, as well as its openings in the roof.

When they came to tell about their return, about being lost, and rambling at a fairly rapid pace for two hours when they finally crossed their tracks, the captain was much surprised, and began asking questions concerning the appearance of the inside, the height of the roof, and other points, exclaiming:

"If you are right in thinking that this cave lies immediately opposite the one we explored, then this part of Parker Cliffs must be fairly honeycombed. Did you

notice, boys," he added, "how deep the water was at the entrance?"

Charley, who looked at Harold as if to say: "I told you the captain would ask this question," replied:

"The water is very deep there. We could look down and see the entrance of huge caverns in water so deep as to be almost inky black."

"Then," said the captain, "this part of the island is not only thoroughly honeycombed by the action of the rain-water as it slowly trickles through the limestone, but the sea at the base of the cliffs has been eating its way underneath the mass."

"If that is so, captain," said Jack, "it wouldn't take much of an earthquake shock to throw this part of the island into the sea, would it."

"It would not, Jack," was the reply; "but I must try to learn more about the character of the cliffs at this point. We will all go soon and carefully examine them."

"I imagine," continued the captain, "from what you tell me, that after Rompey showed you the way to the boat you found yourselves shut in the grotto by the rising tide. You had no trouble, had you, in breathing, for I do not doubt that the two openings gave plenty of fresh air. Indeed, I have no doubt that on both sides of the cliffs there are a number of places where entrances might be found to the grottoes."

The boys now explained how they had lighted the cave with candles, and of their battle with the giant squid.

"I wonder," he exclaimed, "if you know what a narrow escape you have had from an awful death. It very seldoms happens, when a squid grabs persons, as it did you, that they are able to get away; for it holds with a very tight grip. I imagine the animal was not very large."

When the boys said that its head was nearly two feet in diameter, and that it had ten arms, some of which were over five feet in length, the captain smiled, remarking:

"You were naturally greatly alarmed at the hideous appearance of the animal, and have, without intending to do so, exaggerated the size of the animal."

"Well, captain," said Charley laughing, and holding up a part of the foot or tentacle of the animal that they had put in the boat, "look at this. Here is a substantial exaggeration fully five feet long. Is it not?"

The captain was greatly astonished when he saw this proof of the animal's immense size, and when they told him of the awful fight they had, even after they had been seized by the tentacles of the animal, and how they had continued jabbing it with the spade and bayonet-spear, and how Rompey had aided them, he exclaimed:

"You would have been drawn almost instantly into the mouth of the monster had not its strength been so greatly decreased by the many wounds it received. But come up to the house and get something to eat and wash up."

When the boys attempted to leave the boat they found they had grown so stiff while talking to the

captain, that Harold was almost unable to walk or Charley to use his arms.

"Hello, boys," exclaimed the captain. "I guess the animal gripped you pretty tight."

"You'll think so, Uncle Arthur," exclaimed Harold, "when you see how black and blue we are in all places where the animal grabbed us."

"If that's so," said the captain, "the sooner you get to the house and let me look you over the better it will be."

The condition of the two lads was such that the captain insisted on their going to bed when he bathed the injured parts in a stronger liniment than that they had used in the boat. They had been injured more than they had imagined. Indeed, it was necessary for them to remain in bed all the next day. They were able, however, to leave the bed on the day following and move around the house and near it for short distances and, on the day afterward, they had practically recovered.

Naturally, while kept in the house, the captain gave them much interesting information concerning the habits of a number of animals allied to, or closely resembling, the huge squid that had so nearly killed them, pointing out the difference between the octopus and the squid, telling them a number of interesting stories about the huge sea-animal known to the ancients as the kraken.

As soon as the boys were able to go with them, the captain and Hiram made a careful examination of the

sea-grotto, timing their visit so as to reach the entrance at low tide. They thoroughly explored not only the portions over which the boys had wandered, but pushed their examination much farther, thus showing that the entire mass of limestone of this part of the island was thoroughly honeycombed. They discovered, moreover, that not only had the sea undermined the cliffs at the entrance to the grotto, but that other portions, especially those extending toward the underground passage between the ocean and the lagoon, had also been eaten away by the waves. Indeed, the entire mass appeared to be resting on comparatively frail support over parts of the ocean that were shown by a sounding-line to be in some places of a depth greater than six hundred feet.

When they reached the upper opening of the cave that led to the top of the cliffs, the captain made a careful examination, and came to the conclusion that the sea-grotto was situated in the limestone directly opposite the cave on the side of the ocean they had already explored. But not being quite sure of this, they determined to make a more complete examination of this cave on the next day, when they planned to take boat No. 23 to the ocean side of Parker Cliffs. Next day the examination of the ocean side of the cliffs satisfied the captain that the caves on each side were in the same portion of the limestone and probably communicated with each other.

"It would need but a very slight earthquake shock," said the captain, "to cause this portion of the island

to be swallowed up by the ocean. Indeed, it is a wonder to me that it has not disappeared long ago even without an earthquake shock. It has, of course, been greatly strengthened by the stalactite columns that reach from the roof to the floor of the cave."

As will be remembered, when they erected the house at Jackson Harbor and at Maddox Clearing, they had contemplated putting up an additional house at Parker Cliffs, but what the captain had seen from the examination of the last two days clearly showed him the danger that might result if they selected a site for a house in this part of the island.

"We will certainly never build a house here," he said; "for at any moment the ground may be swallowed up by the ocean."

CHAPTER XXI

Everyday Life on Harding Island

They had now been on Harding Island for nearly half a year, and since they were wearing practically the same clothes they had on when they hurriedly left the sinking Ketrel and took to the open boats, they were, indeed, in a sorry plight. This was especially so with the younger boys; for, as every one knows, active boys are especially hard on clothing. It is true that Hiram had mended their clothes time and time again, but since there was none of the original material left, whenever their garments needed patching he had been obliged to employ pieces of the colored blankets, so that the clothing had assumed an appearance that was far from beautiful.

This lack of proper dress had given the captain much worriment. Although the goods rescued from the wrecked brig were both abundant and varied as far as food products, groceries, household goods, and hardware were concerned, yet there was practically nothing in the way of clothing or drygoods, except the blankets and some highly colored calico prints.

"Hiram," said the captain one day, "what can we do for new clothing? Look at the boys. Their clothes are scarcely decent. Can you suggest anything?"

"Wall," said Hiram, "we might make clothes out

of the warigated blankets, just as we made overcoats when we were off the Aleutian Islands, but I reckon they'd be a bit too hot so near the Equator."

"Much too hot, indeed," said the captain. "Is there nothing else we can use?"

"Thar's them printed calicoes," was the reply. "But while they'll make fust-class underclothes, I'm thinking they wouldn't be much for outside clothes. They'd tear so tarnation easy. But, I say, cap'n," he continued, "I reckon we kin manage if ye aren't too partikler as to looks."

"Never mind the looks, Hiram," was the reply. "There are no strangers here to see us, so let's hear your plan, Hiram."

"Wall," was the reply, "we hev several dozen mattresses kivered with good, strong cotton ticking. Ef ye take the ticking off them we could use it fer making clothes."

The captain smiled when he heard Hiram's proposition. Evidently something ludicrous suggested itself to him, but since the boys were present he controlled his features, and remarked:

"Very well, Hiram; we'll begin to-morrow after breakfast making suits of ticking clothes, as well as underwear from the calico prints. You'll cut out and fit and we'll sew."

The experience all, excepting Charley, had with the blanket overcoats enabled them to do the making part in a manner highly creditable to amateurs. Charley too, rapidly learned how to sew. Hiram did

his part admirably. He not only made good fits, but made them in what might be called good style. But unfortunately there was a marked incongruity between the stylish articles of clothing and the character of the goods out of which they were made. The ticking mattresses were of that very common pattern, consisting of alternate stripes of white and a blue so deep in color as to appear almost black. Indeed, when they wore these clothes for the first time, Jack remarked to the captain:

"We certainly ought to save enough of our old clothes to cover one of us. Should a vessel ever come to take us off the island, we might then have enough decent clothes left to cover the one who talks with the rescuers while the others hide."

"Why should we hide, Jack?" inquired Harold. "Our clothes fit all right, don't they? I'm sure they are much better than the rags we've been wearing."

"That's all right, Harold," said Jack; "but any one seeing us might take us for convicts who had been sent away from their own country as being unfit to associate with decent people."

"That's so," said Charley laughing. "Our clothes are striped like those I've seen in pictures of convicts in Botany Bay, Australia."

"I was thinking of that, Charley," said the captain, "when Hiram first proposed to make the clothing out of the bed-ticking. But it's the best we can do, and since the stuff is strong and covers us, I guess we need not care."

But if the outer clothing was objectionable on account of its pattern, the calico prints employed for underwear were even more so. The calico itself was nice and soft, and answered its purpose admirably so far as mere material was concerned, but the style was something awful. The colors, if anything, were gaudier than those of the highly colored blankets and, like them, violated every rule of good taste, there being impossible combinations of bright blues, greens, reds, and yellows, contrasted in a ludicrous manner. What made the pattern the more remarkable was that it did not consist of stripes or bands as in the case of the blankets, but of combinations of stars, half-moons, circles, triangles, squares, etc. Indeed, these patterns appeared to have been first efforts of young designers that were afterward sent to the nursery for coloring. Since the underclothes were covered by their outer garments, this fantastic combination of rearranged rainbow colors might have been less objectionable had the colors been fast, but beginning to run as soon as their wearers' bodies became partially moist by perspiration, the designs were transferred to the skin in an exceedingly odd manner.

The first day after donning their new underwear the boys had gone to Maddox Clearing and, after completing their work, had taken the boat over to the swimming-pool. As soon as they had undressed, an involuntary roar followed their appearance.

"We look like living Easter eggs," cried Charley.

"Or like necromancers," said Jack. "Our bodies

are covered with these highly colored moons, stars, squares, circles, triangles, and other hieroglyphics."

They, indeed, presented a wonderful appearance. The colors had been transferred in such a manner as to cover them with sharply marked pictures of the designs. It is true that here and there the forms had wrinkled on their bodies, but they were nevertheless sufficiently distinct to show the shapes of the heavenly bodies or of other odd figures.

"If there were any people here to see us," said Harold, "we might make money exhibiting ourselves as the Tattooed Men of the Pacific.'"

"You mean the tattooed kids," said Jack.

"Tattooed kids and a giraffe," was the reply. For Jack was at the time of life when boys begin to grow tall and awkward.

"Let's wash the stuff off," remarked Jack. "I've heard that some of these coloring matters are very poisonous."

But it was easier to suggest washing the designs off than actually to do so. "Like Aunt Jemima's famous plaster, the more they tried to wash them off the more they stuck the faster." Nor, strange to say, did the figures run to any great extent, but preserved their outlines. The aniline dye stuffs employed in the prints, as is well known, are very strong dyes, especially for such surfaces as the human skin. Sinking in through the pores the designs positively refused to be removed by water, especially by salt water, so that the scrubbing only served to bring them out more distinctly.

Jack's failure to remove the colors from his body greatly pleased the younger boys.

"I guess you'll have to keep them, Jack. But don't worry, they'll probably wear off in two or three weeks," said Charley.

Since the exploration of the sea-grotto at Parker Cliffs, and their battle with the giant squid, matters had been running on smoothly. The kitchen garden at Jackson House was in a highly satisfactory condition. This was due not only to the wonderful fertility of its soil, but also to the care given to it. The sweet potatoes, beets, and the onions were acquiring better qualities than those they had found in almost a wild state at the Maddox Clearing. As the captain informed them the tendency of most cultivated plants, when left to nature, was to revert to their original wild condition, and so regain less desirable properties. Maddox probably obtained from the clearing much better vegetables than those found by the boys.

Observing that some of the cans of tomatoes had not apparently been subjected to a very high temperature before being sealed, the captain sowed some of the seeds, and was greatly surprised and rejoiced to find that many of them germinated. In this manner they raised both in the vegetable garden at Maddox Clearing, as well as in the kitchen garden at Jackson House, large, juicy, and finely flavored tomatoes, that formed a pleasant addition to their daily food. Indeed, the requisites for luxuriant growth of vegetation of all

kinds existed on Harding Island to a marked extent. Even the comparatively thin soil that covered the hard limestone rock to a depth of only a few inches, was capable of producing a magnificent growth. It was natural, therefore, when to the increase both in depth and richness of the soil, there was added the intelligent care given to the crops that a much better quality was produced than any they had ever before seen. Moreover, the comparatively equable climate of the island rendered a constant succession of crops possible. Their gardens were practically never free from growing plants, as they would have been in the temperate zones during the colder parts of the year.

Since they had been able to add to the morning glories, cypress and clematis vines, planted in beds at the sides of the house, a number of vines found growing in different parts of the island, the porches both at the front, back, and sides, were soon covered with flowering vines that made them pleasant places for resting and reading during the hotter hours of the day.

Both the captain and Jack frequently took advantage of this graceful shade while carrying on the literary work in which they were engaged. Although the younger boys spent some of their time on the porch in studying or reciting their lessons to the captain, yet nearly all their spare time was spent either in boat No. 13, or in The Chums. The latter boat was, perhaps, the more frequently employed on account of the added attraction of the swimming-pool.

But it must not be supposed they never visited Twin Island No. 2, or the two smaller islands known as the Kids. There were so many interesting things on these islands that they went there frequently, and seldom returned without bringing back various mineral or vegetable specimens. They knew that as a rule these specimens would form the subject of interesting talks. When, as was of course sometimes the case, neither the captain nor Hiram had ever seen the kind of specimens before, to their great delight, an excursion was made for the purpose of studying their peculiarities in the places from which they had been obtained.

Jack had been studying various scientific branches with the captain. Among these was mineralogy, and at the captain's advice he had commenced making a collection of the minerals found on the island.

There is a great fascination in collecting such natural objects as minerals, leaves, flowers, insects, etc., that extends to the young as well as to adults. Indeed, the collecting mania is frequently highly developed in the young, especially in the case of bright boys like Harold and Charley, so that besides assisting Jack in his collection of minerals the younger lads began collections of their own.

But making a collection of minerals on a coral island is very different from making one in almost any other part of the world; as, for example, in England or Australia. In these countries, by reason of the extent and diversity of their surfaces, it is possible to obtain a great number of different species as well as

varieties of minerals. On a coral island, on the contrary, where almost the entire land consists of but a single mineral, limestone or carbonate of lime, it is very difficult greatly to multiply the number of specimens.

One day Jack was bemoaning to the captain the fact that although he had now been hard at work with his collection for several months, yet the number of mineral species obtained was exceedingly small, and consisted almost entirely of carbonate of lime.

"That must necessarily be so," replied the captain, "since, as of course you know, almost the entire island is formed of limestone taken from the waters of the ocean. Of course, there are some minerals that have been deposited by the evaporation of ocean water. Some too have been formed by subsequent chemical combinations between the limestone and the materials obtained from the bodies of animals, or from the excrements of birds and fishes, and some have been brought to the island in the form of volcanic products, such as pumice or ashes. Let me see what you have collected."

"Well," replied Jack, "to begin with, I have—— But," stopping a moment, he added, "let me show you what I have in a box of drawers Hiram made for me. Come along, boys," he added to Harold and Charley, "if you care to see them."

Going to a compact chest of shallow drawers, and pulling out one of the drawers, he picked up a specimen and remarked:

"This is the commonest form of limestone on the

island. It has been formed by the grinding of the bodies of corals, shells of mollusks, and the bones of fishes into a fine powder or sand. These particles have afterward been cemented together by water containing lime in solution. While I understand that most of this lime has been derived from the hard portions of coral polyps, yet the different ingredients have been ground so fine and have been so thoroughly mixed together that it is impossible to tell whether they consist of corals, mollusks, or fishes, even when examined by a strong magnifying-glass. As you see, there has been formed a compact, structureless mass of limestone."

Charley, who had closely followed what Jack had said, turned to the captain and asked why it was that the smaller specimens of limestone in Jack's cabinet possessed the same general angular shapes as did the larger fragments from which they had been broken.

"That," said the captain, "is due to a peculiarity of mineral substances called fracture or cleavage. The way in which minerals break often greatly aids one in recognizing them. Now, some minerals always break in thin sheets."

"Jack," interrupted Charley, "that's just how the white stuff Harold and I brought you the other day from the dry lagoon in Kid Island No. 2 does. Let's see that specimen, please."

Jack then took from another drawer a specimen marked selenite—gypsum or sulphate of lime. It was a white, shiny mineral that, as Charley had remarked,

could be split by the penknife into thin sheets somewhat like the mica they had often seen while in England or Australia in the doors of stoves, except that these sheets were somewhat thicker. Like most other lime minerals it could easily be scratched by a penknife.

"Now," said Jack, turning to another drawer, "here is a kind of limestone the separate particles of which are so much larger that one can easily tell whether they are fragments of corals, shells, or the bones of fishes. As in the case of the other limestone, the particles have been cemented together by water containing lime in solution."

The same drawer contained specimens that differed from one another only in the size of the separate fragments. In some the fragments had been rounded by the water, just as the pebbles of a brook that have been rubbed against one another until all the rough edges have been worn off. In some the fragments were rounded like minute eggs, and when cemented together by lime formed a variety of limestone known as oolitic, or egg-shaped limestone. In others, angular fragments of different sizes had been cemented together with their rough edges unchanged, forming what are called conglomerate limestones. Besides these were another class in which the fragments were only partially rounded and were of varying sizes.

Another drawer contained specimens of a beach limestone rock formed by the sand washed up on the beaches by the waves, and afterward cemented together by dissolved lime. Different specimens of the beach

limestones varied greatly in the force with which the particles were held together. Some were strong enough to form good building material, while in others the particles were held so feebly that the rock could be easily powdered by merely squeezing it firmly in the hand. A number of similar specimens consisted of particles of sand heaped up by the winds, and afterward cemented together by water containing lime in solution.

Still another drawer contained specimens resembling chalk. These consisted of finely divided limestone, the separate particles of which were so feebly cemented together that they could be easily torn apart. Indeed, it is this fact that renders chalk so useful in marking; for, when drawn over a blackboard, or other surface, some of its particles are torn off and left clinging to the surface.

Another set of specimens, marked magnesian limestones or dolomites, somewhat resembled a white marble. As the captain informed them these contained besides carbonate of lime, a certain quantity of carbonate of magnesia.

Besides the above there were many other specimens of limestones that we will not take the time to describe.

"I had no idea, Jack," said the captain, "that your collection was so large. I do not think you have any reason whatever to complain considering the time you have been at work and the place from which your specimens have been taken. Although the number of species in your collection is small, yet it is already nearly completed as regards the species that actually

exist on the island. Indeed, from this standpoint, I think your cabinet of the native minerals of Harding Island is more nearly complete than many cabinets I have examined in England that aim at containing all native English species."

But we have not the space to follow Jack, as, pulling out drawer after drawer, he exhibited some of the other minerals found on the island. Among these were specimens of rock-salt obtained from the lagoon of some of the islands by evaporation of the ocean water, especially from the dried-up lagoon of the smaller of the Twin Islands. There were also various other minerals obtained from the ocean water by evaporation, and consisting of iodides, bromides, chlorides, of sodium, potassium, magnesium, etc., together with crystals of phosphate of lime obtained by the combination of lime with phosphorus from the guano beds.

Besides the above there were collections of different specimens of loose finely divided materials, such as washed beach sand, and blown sand of varying sizes, together with various kinds of volcanic ashes that had not yet been cemented together.

To the above Jack might have added the minerals brought to the island entangled in the roots of floating trees, carried there by the ocean currents. Since, however, he was only collecting native species, at the captain's advice, he did not place any of these minerals in his cabinet.

Another collection made, not only by Jack and the boys, but also by the captain and Hiram, was of speci-

mens of the hard portions of the coral polyps, or what might be styled the coral skeletons. Different species of coral polyps produce characteristic skeletons, most of which are very beautiful, especially when all the dead polyps have been removed by thorough washing, and the mass bleached by exposure to the sun. They had obtained a magnificent collection of these skeletons which they had arranged in one of the spare rooms forming what they called the Harding Museum. In the same room they had placed numerous stalactites and stalagmites that greatly added to the beauty of the collection.

Before closing this description of the Harding Museum we must not forget to mention what was, perhaps, the most beautiful forms in which carbonate of lime occurs; this was a magnificent collection of the shells of different mollusks.

When the examination of Jack's cabinet was completed, Charley, who, as has been seen, was somewhat of a wag, turning to Jack exclaimed in assumed astonishment:

"Jack, I'm surprised you have no specimen of the commonest mineral on the island—a mineral, so to speak, from which all your specimens as well as all those in the museum have been obtained."

The captain smiled when he heard Charley's remarks, since he saw at once to what the lad was referring. Jack, however, failed to understand him and exclaimed:

"What are you talking about, Charley? I know of

no such mineral. Indeed, unless you can show me a specimen of it, I shall feel that you are mistaken."

"I have a specimen, all right, Jack," was the reply. "I collected it this morning. Wait a moment and I'll bring it here. I left it in our room."

Charley returned in a few moments bringing a large, clear, glass bottle filled with ocean water. He had pasted a sheet of paper on the side of the bottle on which he had written: "All the minerals in this room came out of me."

"I thought, captain," he said, "we would place this in the museum surrounded by the coral skeletons and the stalactites and stalagmites, shells, etc."

"That's not a bad idea, Charley," said Jack laughing. "Water is a mineral. Moreover, all my minerals as well as all the specimens in the museum were once dissolved in the waters of the ocean. I will add something to the label on the bottle." He then wrote the following, which he copied from one of the books of the library:

Composition of Ocean Water. (Bischof.)

Of the 3.527 pounds by weight of dissolved saline substance found in every 100 pounds of ocean water there are:

Chloride of Sodium	75.79	pounds
Chloride of Magnesium	9.16	"
Chloride of Potassium	3.16	"
Bromide of Sodium	1.18	"
Sulphate of Lime	5.60	"
Sulphate of Magnesia and traces of many other minerals	5.11	"
	100.00	"

"Is it correct to call water a mineral, Uncle Arthur?" inquired Harold.

"It certainly is, Harold," replied the captain. "A mineral is an organic substance occurring as a definite chemical compound, and capable of assuming a definite crystalline form. Water is, therefore, as much a mineral as is limestone. It does not make any difference that because its fusing point is so low it generally occurs in a liquid condition. It is capable of assuming a crystalline form, as can be seen both in the snowflake as well as in some form of hailstones."

CHAPTER XXII

The Earthquake

Although Harding Island lay within the limits of the Southeast Trade Winds, yet the characteristic southeast winds were almost entirely absent during the hottest part of the day. This was because at this time the ascending current from the heated land lifted the Trade Winds as they approached the island and thus prevented them from reaching the surface. The winds of the island as a rule were, therefore, light and, indeed, at times were almost absent. There were, nevertheless, severe storms that crossed the island, but these were fortunately rare.

During certain seasons of the year rains were especially heavy and frequent on Harding Island, nor was there dry weather during any protracted time. Consequently, there was never any difficulty in obtaining an abundant supply of fresh drinking water.

One afternoon, while the boys were standing with the captain on the porch of Jackson House facing the ocean, a heavy squall of rain was seen approaching the island. Instead of reaching them, however, it separated as it passed over the shore platform into two distinct portions that blew over the ocean off the eastern and western sides of the island, respectively.

"How strange, captain," said Jack. "Can that movement of the storm be explained?"

"It's very simple, Jack," was the reply, "when you understand it. You know how hot the air over the sand grows toward the middle of the day when the sky is clear. This heated air column, rising, pushes aside the approaching rain-storm as we have seen."

Since the exploration of the grotto at Parker Cliffs, there had been much discussion as to the nature of the force that had raised this part of the island so much above the general level. They knew that according to Darwin the island had been gradually sinking, so that the part near Parker Cliffs must have had a local elevation. The question arose as to whether this elevation had been gradual or sudden. One day a discovery was made that enabled the captain to reach a definite conclusion concerning the matter. They had been walking over the beach immediately south of Parker Cliffs. An unusual tide and wind, washing away the sand, had laid bare the limestone rock beneath. A narrow fissure could be seen extending nearly east and west across the island from the ocean to the lagoon. Although originally at the same level, the rock on the northern side of the fissure was several feet higher than on the opposite side, so that a wall, a few feet in height, marked the parts that had been fissured. The island had evidently been split or fissured at this part by some force that had suddenly raised it north of the line.

"It is certain," said the captain, "that Parker Cliffs owe their elevation to a sudden upward movement."

"Do you mean a movement like an earthquake?" inquired Jack.

"Yes," was the reply. "Harding Island has evidently been visited by severe earthquakes in the past, and may again be so visited at almost any time in the future."

"Then, captain," said Jack, "from what we know as to the condition of a part of Parker Cliffs, if Harding Island is again visited by an earthquake this portion might cave in, might it not?"

"Yes," was the reply; "and if it did, a deep channel connnecting the lagoon and the ocean would probably be formed."

"Do you think such an earthquake would damage the other parts of the island?" asked Jack.

"Not so far as the shock itself is concerned," replied the captain. "Harding Island rests on so solid a foundation, possibly on a mass of limestone several thousand feet in thickness, that it ought to be able to withstand extremely severe shocks. Great damage might, however, be caused by the waves that generally follow earthquakes at sea. I need not tell you that if a wave thirty or forty feet high should sweep over our island it would probably leave very little standing."

"Let's look for the other fissure," continued the captain, after they had examined the one just referred to. "Of course, you understand," he said to the boys, "that if this break was caused by a portion of the

reef being pushed up at this part of the island, another crack or fissure must have formed somewhere on the north."

They had much trouble in finding the other fissure, but after a persistent examination of many hours they found it, extending between the ocean and the lagoon on that part of the island immediately north of the elevated lands of Parker Cliffs.

One day, while the captain was walking with the two younger boys along the edge of the shore platform, he pointed to a brownish object nearly globular in shape that had been washed up from the deeper waters, and was lying on the nearly dry surface of the shore platform, for it was then low tide.

"Would any of you like a good bath sponge, boys?" he inquired. "I noticed the other day at the swimming-pool, when you were washing, you had no wash-rag other than your hands."

"I'd like it very much, Uncle Arthur," exclaimed Harold; "but the trouble is there were no sponges on the brig, so we can't get one."

"Why, Harold," said his uncle, "there is a sponge lying right in front of you."

"What!" exclaimed Harold, picking it up. "This dirty-looking thing a sponge! Why, uncle, it's full of sticky stuff like glue, and has sharp needle-shaped things in it. If a fellow should use that as a sponge he wouldn't get much help toward being made cleaner, for he would only smear his body with this dirty, bad-smelling glue, but would also scratch it with these

stickers. Honest, Uncle Arthur, is that a sponge, or are you only joking?"

"No, Harold," was the reply, "that is a sponge. See here," he said, taking it in his hand and pointing to the part by which it had been attached to the bottom of the ocean, "here is where the animal, for a sponge is a sea-animal, attached itself to the rocky bottom. Something, I do not know what, has torn it from its support.

"It is true," continued the captain, "we could not use the sponge in its present condition. We must first get rid of the animal. To do this, we'll place it on the dry beach in the position it had when growing in the water. Most of the jellylike body will then decompose and run off. Then we'll put it again in the water until softened when, by squeezing and washing, the remaining portions of the dead animal as well as the sharp spiny skeleton can be removed. Again putting the body in the sun to bleach and again washing in the water, we'll obtain a nice, soft, large sponge as good as any of this kind of sponge you could buy in England or elsewhere."

Following the directions of the captain they succeeded in transforming the repulsive-looking globular ball or mass into a splendid bath-sponge. Now that they knew that sponges were growing in the waters near the shores, they became sponge-fishers. Tearing the animals from the rocks on which they were growing by the use of the tongs Hiram had made for them for getting pearl-oysters, they obtained a species of

sponges varying in shape and differing greatly in fineness or softness. After cleansing and drying, they not only had sponges for use but were able to add a fine collection to the museum. From the books in the library they learned that the sponge they thought to be a single animal consisted in reality of a great number of animals, bound together by a network of elastic fibers.

Perhaps one of the most marked characteristics of life on a coral island is the wonderful quiet, especially near the middle of the day. As a rule, there is then no wind, and in places too far from the coast to permit the sounds of the breakers to reach the ear, there is an almost complete silence. Thus it was one day, while working in the vegetable garden at Maddox Clearing, they were surprised by hearing a moaning sound that seemed to come from the ground beneath them. Rompey, who was lying near his young masters, appeared to be greatly frightened, and creeping close to them, as if claiming their protection, began to utter low moaning sounds.

"What's the matter with Rompey?" said Charley. "See how frightened he looks."

The animal on hearing Charley speak his name endeavored by wagging his tail and low moaning to say:

"I am, indeed, very much frightened, and I'm surprised you are not also frightened."

Of course they all stopped work on hearing the first moaning sounds from below and intently listened. The sounds continued. At first they were faint and

seemed to consist of a great variety of distant noises that were quite feeble when they reached them. But they gradually grew louder and soon became low murmurings, followed occasionally by stronger sounds, somewhat reminding them of the noises heard in the streets of a crowded city.

"I think," said the captain, "these sounds are the forerunner of an earthquake."

"Shall we stay here," inquired Jack, "or will it be safer in some other part of the island?"

"We are safe enough here as far as the shocks are concerned, but the earthquake may be accompanied by an earthquake wave that would sweep over the island."

"Of course," said Jack, "it wouldn't be safe to seek the highlands at Parker Cliffs."

"No," said the captain, "at least not anywhere in the neighborhood of the southern part of the cliffs, which we know are honeycombed and may fall in at any time. It might be safe on the northern portions of the cliffs. I think, however, we had better hurry to boat No. 23 and try to reach the waters of the ocean a few miles from the island before a severe shock. Of course, we will be in danger on the ocean, but I think the danger there will be less than in any place on the island."

Entering The Chums they rowed rapidly to Landing No. 2, and running to boat No. 23 were soon in the deep waters of the ocean, pulling rapidly toward the southwest.

In the meanwhile the subterranean noises grew louder and more frequent. Rumblings were heard resembling distant thunder. At first they were only heard occasionally; that is, a rumbling sound would be followed by comparative silence, although the whisperings and murmurings were practically continuous. The rumblings, increasing in intensity, soon approached in loudness to peals of thunder or the discharge of large siege guns.

Every now and then sounds were heard immediately under the boat as if the keel had struck against a rock. Having already experienced this in the earthquake during the volcanic eruption off the Aleutian Islands, they properly attributed it to the earthquake shock, and continued rowing toward the southwest.

When they had reached a distance of between four and five miles from the island, the successive shocks followed one another so rapidly as to produce an almost continuous roar. Finally, an awful explosion occurred that appeared to come from a point in the ocean off the southeastern shore of Parker Cliffs. While they were looking in this direction they distinctly saw the southern portion of the cliffs suddenly fall in as if swallowed up by the earth, while a shower of spray was dashed up into the air to the height of at least a hundred feet.

"There goes the grotto," said Charley.

"Yes," said the captain, who had been examining this part of the island through his glasses, "and, as I expected, there has been left in its place a channel of

water. A great channel too," he continued. " I should say at least two miles wide. If it is deep enough, Harding Lagoon will offer a splendid harbor for vessels."

While watching the opening thus formed, a wave about one foot in height was seen rapidly approaching from the southwest. It soon reached the boat, but being in deep water instead of being carried toward the island, the boat simply rose and sank on the crest of this wave. The wave continued moving toward the island, and when it reached the shallow water increased in height. It attained a height of over ten feet, striking the remaining portions of Parker Cliffs with so furious a blow that they could feel the island tremble underneath them.

" If the cliffs can stand that," said the captain, " they are strong enough to continue standing."

A wave many feet high rushed through Harding Lagoon and, reaching the eastern coast of Twin Island No. 1, poured over its edge into the lagoon. Fortunately it rapidly decreased in height, so that by the time it reached the western side of the island it was only a few feet above the ordinary level of the water.

The portion of the main wave, however, that passed to the north and south of Twin Island No. 1, sped rapidly across the deep waters of the Harding Lagoon and broke against the western shore with a decreased height when it struck the beach.

" Unless there are other waves from the ocean," said the captain, " I do not think that any great damage will be done to our houses or crops."

No other waves came. The disturbance appeared to limit itself to the wave that first reached the island.

Hiram, who had been examining the new channel, which they agreed to call the Harding Channel, through the glasses, remarked:

"Thet's a nice piece of water atween the Harding Lagoon and the ocean. I reckon it's full two miles across, en I kain't see enything like land a-sticking up above the top. Ef it's good deep water, ez it looks, Harding Channel will connect the ocean with a harbor in the lagoon big enough to take a-wery many wessels. Take another look, cap'n," he continued, handing the glasses to him.

A careful examination by the captain seemed to show that, as Hiram had said, Harding Channel was free from shallow water, for the waters were now pouring through it with a considerable velocity toward the ocean.

"Hiram," said the captain, "do you think we can now safely take the boat nearer to the lagoon where we can see better what has happened?"

"I bean't as much up on earthquakes as ye, cap'n," was the reply.

"Well," said the captain, "let us take the boat a mile nearer and wait an hour. Then, if the earthquake appears to be over, we'll take the boat through the new channel into the lagoon."

Waiting, as suggested, and nothing occurring, the boat was soon at the mouth of the channel. There were no signs of shallow water so, without any hesita-

tion, they entered the channel directing the boat toward the lagoon. Thinking it would be more prudent to defer the examination of the land at this part of the island to another day, and feeling anxious to see if the waves had destroyed their vegetable garden, they rowed the boat directly to Landing No. 3 when, crossing the reef to Landing No. 4, they entered The Chums. The waves had washed away portions of the clearing nearest the lagoon but, on the whole, the damage was much less than they had feared. Maddox House had not been injured, except that a pile of sand and mud had been deposited by the waters in the flower-beds placed along the sides of the house.

After satisfying themselves that no other damage had been done they entered boat No. 23 and, proceeding to Jackson House, made an examination that showed them the damage had been even less than at Maddox House. Part of the kitchen garden had been washed out, but the house was untouched. On the whole, therefore, the damage had been comparatively insignificant.

"Had the earthquake wave come from the south-east," said the captain, "the ruin would probably have been complete; but coming as it did from the south-west, it spent the greater part of its energy on the cliffs at that part of the island."

CHAPTER XXIII

After the Earthquake

It was late at night when they reached Jackson House after the great earthquake. As was natural, they continued talking after supper until near midnight.

"Let's turn in," at last said the captain. "There is much to be done to-morrow. We have only a general idea as to how the earthquake has left Harding Island. I think we had better spend the next four or five days in a careful examination of the different parts of the island, as well as to make soundings in the channel and in the ocean at least a mile or so off Parker Cliffs. Of course, I wish you all to accompany me."

"That'll be jolly," cried Charley.

"What boat will you take, captain?" inquired Jack.

"We'll take boats No. 23 and 13."

It was now possible to take both boats from Landing No. 2, since they had taken boat No. 23 on the ocean from Landing No. 1 when they fled from the island to the waters of the ocean, and had afterward brought it into the Harding Lagoon through the Harding Channel.

"Will you have Jack in boat No. 23, and I and the two youngsters in boat No. 13, cap'n?" inquired Hiram.

"No, Hiram; you and I will take boat No. 23, and Jack and the boys boat No. 13."

"I'll git up early, cap'n," said Hiram, "and load the boats. What do ye want put in 'em?"

"We'll all do our share of work, Hiram," said the captain. "While you are getting breakfast and cooking the food for use while we are away, the boys and I will get the boats ready. After breakfast you can help us, for there is much that we must take with us."

The desire to examine the portions of the island that had been left standing in the neighborhood of Parker Cliffs, as well as to visit other places, was so great that they were all up at an early hour, at least early when the hour at which they retired is taken into consideration.

Since, during much of their absence they would be on the ocean, the captain directed the boys to fill the water-butts in the boats with fresh water, and to place an additional butt in each boat. He also gave them instructions as to the quantity of food to be placed in each of the boats. The amount both of water and food was so great that Harold was greatly surprised.

"Why, Uncle Arthur," he said, "there will be enough food to last several weeks. What's the use of taking so much?"

The lad had reason not long afterward to remember the answer the captain made to his question.

"We expect to spend many hours on the ocean. Should a storm arise we might be compelled to remain in the boats for a whole day, or even many days. It

would be foolish, therefore, not to place an abundance of fresh water and food in each of the boats, now that we can easily do so."

I suppose some of my young readers may wish to know why the captain had planned an excursion on the ocean a mile or so from Harding Island. In the first place, it was necessary that they should know, at least approximately, the depth of water in the new channel. The captain had, therefore, planned to take soundings of the channel. But, besides this, he wished to know whether any marked changes of level had occurred in the shore platform of Harding Island, especially in the deeper waters on the edge of the shore platform. It will be remembered that the captain had become greatly interested in the revision of the manuscript of the "Physical Geography of the Sea," found among other things in the cabin of the derelict brig. Now, one of the chapters of this book requiring the greatest amount of additional information, was that referring to the changes produced by earthquakes in the depths of the water around islands situated at great distances from the continents. Consequently, the captain determined to make soundings in the waters several miles off the coast in order to determine whether any marked shoaling had occurred. Therefore, when the boats were packed and the provisions and water stowed out of the way, sounding-lines were carefully coiled in each boat where they could be used either separately for the shallower waters, or connected together as a single line for the deeper waters. Since the boat con-

taining Jack and the boys was only to make shallow soundings a single coil of line sufficed, but for the captain's boat there were three separate lines, each of considerable length. When the boats were ready to leave, the question arose as to whether or not Rompey should accompany the boys. Rompey apparently was of the opinion that he would of course be taken, and had settled himself in the bottom of the boat at Charley's feet, and was showing that he expected to have a great time by the little joyous barkings in which he was indulging.

"Is there any objection to Rompey going with us, captain?" inquired Jack.

"Oh, please let him go, Uncle Arthur!" pleaded Harold.

"There is no objection to your taking Rompey," was the reply. "I guess he'll behave himself. You don't object to your having him in your boat, do you, Jack?" inquired the captain.

"Not at all, captain," was the reply. "If the dog behaves himself he will not be in the way."

"Do you hear that, Rompey?" said Charley, talking to the dog as if he understood him.

Rompey's reply was very much to the point. It consisted of a complicated series of tail waggings as well as of barkings extending for a considerable length through the dog's gamut. Charley thoroughly understood Rompey's remarks, or at least he thought he did; and for my part, I thoroughly believe the dog also understood generally what his young master said.

Now I do not doubt that many of my older readers will not hesitate to express their belief that what I have so frequently said concerning Rompey's ability to understand conversation is highly imaginary, or at least much overdrawn. I need not repeat here the opinion I have several times expressed as to the reasoning powers of animals. I feel that I can confidently appeal to my young readers when I ask them if they do not remember, when talking to a dog or some other pet animal, that the animal has acted as though it understood just what was said. Rompey certainly did on this particular occasion to such an extent as to leave in the minds of all of the five a thorough belief as to his ability to understand English.

Pushing off from the shore the two boats started in a direct course toward Twin Island No. 1 and the new channel at Parker Cliffs, the captain's boat leading and Jack's boat following near enough to permit conversation to be carried on between the boats when speaking in a fairly loud tone. Since neither of the boats was provided with more than four oars, in the boys' boat Jack pulled stroke with two oars, while Harold and Charley sitting on the same seat pulled each a single oar.

When they were within a few miles of Harding Channel, Harold, who had turned around so as to see the island near Parker Cliffs, suddenly cried:

"Look over your shoulder, Jack," and then calling aloud to the boat ahead: "Uncle Arthur, what are all those birds doing near the new channel?"

It is no wonder that Harold was amazed; for, looking in the direction indicated, they saw thousands upon thousands of birds that had collected on the beach of the lagoon on each side of the channel.

"What are they doing!" replied Charley before the captain could answer. "Can't you see, Harold, what they're doing? they're fishing. Look," he cried, "every now and then a bird leaves the beach carrying off a good-sized fish in his talons. I should think you could see that," he said laughing.

"Oh, you understand me all right," said Harold good-naturedly. "What I meant to say was what has brought the birds there," and then seeing that Charley was going to add, "the fish," he again corrected himself and said: "What's up there, anyhow?"

"Now you're talking," said Charley.

The captain, who had overheard the conversation between the boys and had enjoyed the good-natured chaffing, replied:

"I do not doubt, Harold, the fish have been killed in great numbers by the shock of the earthquake. I don't so much mean the fish in the lagoon as those in the ocean near the place where the shock first occurred. They have been either killed outright or, having been rendered insensible by the shock, have been carried by the waves through the channel and thrown on the nearer coasts of the lagoon. I think we shall probably find still greater numbers on the beach facing the ocean."

"Shall we hurry to the island and drive the birds

away so as to get the fish ourselves, uncle?" inquired Harold.

"By no means," was the reply. "On the contrary, let the birds take all they can. They are only doing work we would otherwise be obliged to do ourselves. I do not doubt the number of fish killed is so great that unless we find means for burying or getting rid of them they will soon putrefy and poison the air over the island with the diagreeable gases they give off."

"Do you notice, captain," said Jack, "that most of the birds have collected in the neighborhood of the beach near the new channel?"

"Yes, Jack," was the reply, "and I am glad to see it. I think it shows that the dead fish have come mainly from the ocean."

"Cap'n," said Hiram, "let's find a landing-place, and take a look at them fish. At the same time we kin see what the shaking hez done to what's left of Parker Cliffs."

As they approached the northern shores of the channel, they were fortunate in finding a landing-place at its mouth near the Harding Lagoon. Here, as they could see at a glance, a great change of level had occurred not only in the site occupied by the new channel, but also as to the southern ends of what had been left standing. Adjoining the channel a portion had been broken into fragments that had slid toward the water, forming a steep incline.

The greater part of what had been left standing north of the channel had nearly retained its original height.

In the place where they had landed the boat there was still a precipitous cliff left about fifty feet high, on one of the faces of which there was an entrance to a sea-grotto that appeared to extend only a short distance into the cliff itself.

Leaving the boat they made an examination of the coast of the lagoon toward the north when, taking the boat through the channel, they anchored it near its mouth at the ocean and proceeded to examine the coast by walking along the beach toward the north.

Here, as the captain had predicted, the number of fish brought in from the ocean was enormously greater than on the opposite side. They had not only been piled up along the beach and on the shore platform, for it was then low tide, where they were being eagerly devoured by even greater numbers of birds than they had seen on the opposite shore, but had also been washed in still greater numbers into the waters on the edge of the shore platform. Here they were floating in such quantities as fairly to cover the surface of the water. Huge sharks and other large fish, that had been attracted from portions of the ocean that had not been affected by the shock, were eagerly devouring them.

"Here is another welcome help for burying the dead fish," said the captain.

Walking farther along the coast toward the north they observed an unusual commotion in the water, and on approaching saw that it was due to a battle between a giant squid and a shark. The squid was even larger than the one that had attacked the boys in the grotto.

It was probably one of the many that had been deprived of shelter by the sudden caving in of the sea-grottoes. The shark was biting furiously at such of the tentacles of the animal as it could reach, but the squid, apparently conscious of the fact that it was mainly the mouth of the shark it need fear, had fastened itself on its back, midway between the head and the tail, and was apparently endeavoring to choke it by wrapping some of its huge tentacles around the animal near its throat. But besides this, in order to protect itself from the fearful lashings of the shark's tail, the squid was vainly endeavoring to hold this portion of its enemy still by coiling its remaining tentacles around it. The huge head of the animal with its awful-looking eyes was held high above the shark's body. But it was an unequal fight, and was soon decided in favor of the shark; for, finally succeeding in freeing its tail, it began a series of thrashings that rapidly weakened the animal's hold.

It is true that the squid endeavored to meet this change of its enemy's tactics by slipping its body into a new position. At last, however, when changing the position of its tentacles for this purpose, its head was brought near the huge mouth of the shark, which at once began rapidly to cut and tear it.

The water of the ocean was soon stained, not only by the inky matter thrown out by the animal, but also by the blood that came pouring out of its body, and in a short time the battle was over. The shark, though considerably blown, after a few moments' rest began

greedily eating such portions of the giant squid that had been left by the many additional sharks that had arrived just as the battle had ended.

The balance of the day was spent in the boat making soundings of the new channel in the portion of its waters near its northern shores. The two boats were about ten feet apart, the nearer boat being about the same distance from the northern shores of the channel.

"How much do you make it, Hiram?" inquired the captain, as his companion pulled up the sounding-line.

"A slack fifteen fathoms, sir," was the reply.

"And what do you make it, Jack?"

"Full fifteen fathoms, captain."

In this manner the two boats proceeded along the northern shores of the channel, and when the depth of the water had been ascertained in this manner they again made soundings at distances of thirty and forty feet along the shore, and afterward at distances of fifty and sixty feet. In this manner, they found that the depth of the water varied from fifteen to twenty-five fathoms near the shore, while farther out it was much deeper, being from thirty to forty fathoms. It was evident, therefore, that the largest ships could safely pass, at any tide, through this part of the Harding Channel into the waters of the lagoon, which were likewise deep enough to float them.

"Let's see whether the earthquake wave has moved the coral-encrusted wreck, uncle," cried Harold.

"An excellent suggestion," remarked the captain. "If any change of level has taken place in this place

we can see it at once, since we know the depth from the position of the vessel."

An examination showed that the vessel was missing. A further examination disclosed it as having been thrown high and dry on the coast close to a portion of the cliff. They could now have easily examined all parts of the wreck and its wonderful incrustations of coral, but there were so many other more important things to do that they put it off for a more convenient time.

CHAPTER XXIV

The Captain and Hiram Blown Out to Sea. Captain Jack

Early next morning they began sounding the ocean, both near the shore as well as at a considerable distance therefrom. While this work was going on a serious disaster occurred. At a time when Hiram and the captain were making soundings at a distance of four miles from the island, and Jack's boat was sounding in the shallower waters near the shore platform, a storm overtook them so suddenly that they had hardly commenced to notice it before it was on them.

The storm was accompanied by a strong wind blowing toward the northwest. The wind increased rapidly in force and was accompanied for most of the time by a deluge of rain, that together with dense clouds completely shut off their view both from the island and from each other's boats. The rain fell in such torrents that it was necessary for one in each crew constantly to bail the water out in order to prevent the boat from sinking.

We will limit our description for the present to the boys. At first they endeavored to row their boat in the direction of the island, but the force of the wind was too great to render this safe; so they found it necessary to permit the boat to be carried along with

the wind, keeping it, of course, so that the wind was received not broadside but directly against the stern.

The storm continued for between seven and eight hours, and during all this time they were unable to see the other boat. At last the storm ceased, and the wind died down almost as quickly as it had begun. The clouds disappeared, and a flood of sunshine fell upon the waters, but neither the island nor the other boat was in sight. Above was the blue arch of heaven extending in the shape of a huge dome within which nothing, except their own boat, was to be seen at the center of the great waste of waters.

"What shall we do, Jack?" inquired Charley. "Try to find the captain or put back to the island?"

"We will by all means return to the island," replied Jack. "I am sure this is what the captain will do. He'll know the general direction in which our boat has been carried by the wind, and will keep on the lookout for us while trying to reach the island."

"And, of course," cried Charley, "we'll do the same thing for the captain's boat."

"Charley," inquired Jack, "according to my recollection, the island lies in that direction," pointing to the southeast. "What do you think?"

"I don't think anything about it," was the reply. "I know it lies in that direction. See here," he said, showing Jack a pocket compass. "I have been keeping track of the direction of the island since the storm began. Since Harold and I were lost in the sea-grotto, when I had carelessly left my pocket compass at Jack-

son House, I have been especially careful to see that I have it with me."

"I'm glad you have a compass, Charley," said Jack; "it will be a great aid to us."

"Jack," inquired Harold, "how far from the island do you think we are?"

"I'm not sure," was the reply; "but for the last seven hours or more the wind has been blowing us away from Harding Island at perhaps twenty miles an hour. We are, perhaps, something in the neighborhood of a hundred and fifty miles from the island."

"A big distance to cover in a rowboat, Jack," said Charley. "Don't you think we had better start?"

The storm had set in about ten o'clock, and since it had continued for about eight hours, it was now near six o'clock, so they stopped rowing a while and made some simple preparations for supper.

"Ain't the captain a level-headed man, Jack?" remarked Charley. "Do you remember what he said about putting so much food and water in the boats?"

"Yes, Charley," replied Jack; "I think I remember what he said, word for word. It was this: 'We expect to spend many hours on the ocean. Should a storm arise we might be compelled to remain in the boats for a whole day, or even for many days. It would be foolish, therefore, if we did not place an abundance of fresh water and food in the boats now we can so easily do so.'"

"I declare, Jack," said Harold, "that's just what

Uncle Arthur said, word for word. I wonder whether he and Hiram are safe. What do you think?" he added anxiously.

"I see no reason why they should not be. They are better able to take care of themselves than we are, and since we outlived the storm they should be able to do so. They were only a few miles farther out to sea than we were when the storm broke."

"I'm glad there's plenty of food and water in their boat as well as in ours," said Charley; "for, with enough to eat and drink, and a good tight boat, such men as the captain and Hiram certainly ought to be able to take care of themselves."

Harold was greatly encouraged by what he heard, so he comforted himself still more by adding:

"Yes, and their boat had a mast and sail, and they know how to use them."

After eating they continued steadily rowing the boat until the stars came out one after another. The sky being quite clear, they saw the beautiful constellation of the Southern Cross which, as is well known, contains four bright stars, one of which may be regarded as the Pole Star of the Southern Hemisphere.

They concluded to stop rowing and rest for the night, dividing their number into three watches. Jack insisted on taking the first watch, promising to call Charley when the time for his watch arrived.

"At least," he added, "if I don't conclude to keep watch a little longer." For he was Captain Jack now, and would remain so until Captain Harding and Hiram

returned. He, therefore, felt responsible for the safety of his companions.

As the younger boys were getting ready to lie down in the boat, Harold lost his cap overboard and tried to recover it, but was unable to do so for the want of light."

"I guess you'll have to do without it, Harold," said Jack.

The next morning broke bright and clear. Still there was nothing in sight except the same big dome of the horizon and their little boat at the center of the mighty ocean. After a hurried breakfast they continued rowing in the supposed direction of the island, and toward eleven o'clock were delighted to see a faint streak on the southwestern horizon.

"Hurrah!" cried Charley. "That's Harding Island. Don't you think so, Jack? Or," he added smiling, "excuse me, don't you think so, captain? for, of course, Jack, you are Captain Jack now, and I will mind you just as I minded Captain Harding."

"Thank you, Charley," said Jack; "I shall expect obedience. Indeed," he added, "I must; for, should anything happen, I will be held responsible for it."

"And I'll mind you, Jack," said Harold, "just as I would Uncle Arthur."

"Captain," said Charley.

"Oh," said Jack, "when we're together call me Jack."

"Well then, Jack," continued Charley, "aren't you surprised that we have not seen the captain or Hiram

yet? They are men; they could row longer and stronger than we and, moreover, they had a sail."

"I am surprised at not seeing them, Charley," Jack added in a low tone, so as not to let Harold hear him; for Harold was in the stern looking in the direction in which it was evident he hoped he would see the missing boat.

"Now we can see the direction of Harding Island," said Jack; "I think it best that two of us only row, while the other keeps a watch on the ocean to catch the first sight of the other boat if it comes in view. Harold, you'll attend to this for the first few hours."

As they proceeded in this way with Harold in the stern on the lookout, their lookout announced:

"I see my cap floating in the ocean over the starboard bow."

This announcement greatly surprised them. They couldn't understand how the cap could be so far ahead of the boat, for they had now been rowing for many hours.

"I don't understand this, Charley," Jack said, as they stopped to pick up the cap.

"I guess," said Charley, "there's a strong ocean current in this part of the ocean that has carried the cap during the night from where it fell in the water."

"There must, indeed, be such a current," replied Jack; "for, see, the wind is still blowing toward the northwest in the same direction as the wind that accompanied the storm, and directly opposite to that of the ordinary Southeast Trades. I suppose that's the

reason the boat has not drifted as rapidly as the cap."

Their anxiety as to the fate of their companions' boat naturally led them to speak frequently of the absent ones.

"Captain Jack," said Charley, who seemed to take a satisfaction in having a captain to talk to, and had unconsciously made a compromise which permitted him to use both the captain's and his companion's name, "do you know whether the captain or Hiram had a compass?"

"I know the captain always carries a pocket compass with him," was the reply; "and I'm glad of it too," he continued, "for they will be much safer with a compass than without one."

Rompey, who, it will be remembered, accompanied the boys, had behaved himself in a most exemplary manner. He appeared to know that matters were not exactly right, and scanned the faces of his young masters as if desirous of finding out what it was that worried them the most. He apparently came to the conclusion they were looking for something in the water toward which they were rowing the boat, and appointed himself as number two of the watch. There was no little advantage in this for Rompey's ability to see distant objects distinctly very greatly exceeded that of any of the boys.

At last something came within the range of Rompey's sharp vision, so as a good and faithful watch he promptly reported the same, first apparently to his young masters, which was quite wrong from the stand-

point of discipline on a vessel on the sea, and afterward to Jack. While none of them understood just what Rompey said, they knew at once he was reporting something in sight.

"I wonder what Rompey sees in the water over the bow of the boat?" inquired Charley.

"Can he have seen the missing boat?" said Jack.

As he was about to turn around and see for himself, he detected an expression of anxiety on Harold's face.

"What is it Rompey has reported, Harold?" he inquired.

"I am not sure," said Harold, "but I fear it is an oar."

"I hope not," said Jack, turning around, "but I'm afraid you're right. However," he said bravely, "there is no use staying here guessing at it, is there?"

"No," was the reply, "I can now distinctly see an oar, and recognize it as one of the oars from the captain's boat."

Taking their seats, the boys rowed rapidly in the direction of the floating object, and even before they had brought the boat within reach of it and picked it out of the water, all their doubts had vanished. It was one of the oars of the missing boat.

What had become of the boat? Had it been destroyed by the storm? Was it now lying on the bottom of the ocean near the bodies of the two men they all so dearly loved and had hoped to see? Time alone could tell. They sat silently in the boat with the exception of Harold, who commenced crying bitterly at what he

believed was almost positive proof of the drowning of his uncle and Hiram.

"Don't give up too soon," replied Captain Jack to Harold. "Keep on the outlook."

So they continued rowing toward the island, which had now risen higher above the horizon, and was standing up with fair distinctness, although still very many miles distant. They had not proceeded for more than half an hour longer when Rompey's bark again announced the presence of a floating object in the water beyond them, and when they came up to it they picked from the water another oar which they also recognized as one from the boat. As it was placed in the boat alongside the oar first taken out of the water, none of them said anything. Each felt that the others were carefully watching his face to read on it if possible what he thought of the fate of their friends.

Continuing to row toward the island for another hour Rompey again announced an object floating in sight in the water off the bow and, when coming up to it, they saw that it was the broken mast of the boat with its many-colored blanket for a sail, they all broke down and began to bewail the fate of their companions.

"The storm has struck the boat suddenly and broken the mast off near its support," replied Jack, pointing to the splintered end of the mast. "Whether or not it has wrecked and upset the boat, or whether the mast in falling has carried the captain and Hiram with it, we cannot tell."

"But, Jack," said Charley, "you surely don't think

that two good sailors like the captain and Hiram would fail to keep out of the way of the falling mast?"

"That don't worry me at all. If the boat hasn't been upset or injured when the mast fell against it, and the captain and Hiram have one pair of oars left, they may yet return in safety to the island. But, if they have neither oars nor sail, they could do nothing. This is probably the reason we have not yet seen them."

"Captain Jack," said Harold, "what you say is possible; and, although it does look bad for the captain and Hiram, yet they may be alive. Let's hurry to the island, climb the hills on Parker Cliffs where we can see the ocean for a considerable distance. Perhaps we can see them coming toward us."

Jack had intended to do this as soon as Charley had finished speaking. He said, however:

"That's good advice, Harold. We'll follow it."

So they pulled the boat steadily toward the island. At Harold's earnest request Jack permitted him to sit alongside of Charley and row one of the oars; for, as Harold suggested, there was not so much need now for looking for the missing boat. If it came in sight at all it would probably be over their stern.

They continued rowing not only until the sun set, but even far into the night. Indeed, it was near eleven o'clock when, tired and downhearted, they landed on the island at a point on the northern shores of the Harding Channel near the lagoon.

Of course no one was waiting to receive them. They had given up all hopes of that ever since the broken

mast with the blanket sail had been taken into the boat.

Climbing to the top of the cliffs they built a fire and prepared supper in a heartless manner, spending the night in the open air huddling around the fire to keep warm.

Early next morning, half an hour before sunrise, they climbed to the top of Harold Hill. The leaden dull-gray color of the sky and ocean was in keeping with their feelings. Never before had things seemed so dreary and unpromising. They sadly missed the strong, kindly, thoughtful presence of the captain.

But suddenly a faint streak of light was seen on the eastern horizon, and the clouds began to take on the beautiful sunrise colors of crimson and gold. The colors grew stronger, and soon flung their warm tints over the surface of the waters, while the higher clouds began to take on the other tints of the sunrise.

The glories of the rising sun put new courage into the hearts of the boys.

"Look at that, Harold," said Jack, "the God who made the heavens and the earth will look after our dear ones."

They stood watching the sunrise for a few moments.

"Come, boys," said Jack, "there is much to do. It may be that our friends have been wrecked on some lonely island, and are ignorant of the exact location of Harding Island. Let's pile wood on the fire on the cliffs and keep a column of smoke by day and a pillar of fire by night, so as to show them our direction."

But, as they afterward discovered, their companions had been carried so far away that their signals could not be seen by them.

They began to cut down cocoanut trees and to collect the husks of the cocoanuts in a huge pile which, for the whole of that day, they kept burning, throwing on water occasionally during the daytime and keeping it burning brightly during the night.

CHAPTER XXV

More Trouble at Jackson House. Harold's Dream

As the captain had predicted, the putrefying fish made the air in the neighborhood of the new channel so extremely unpleasant, that when not obliged to remain at the lower level they gladly sought the higher land of Parker Cliffs. Remembering what the captain had said as to the probability of their being obliged to bury the fish to prevent an epidemic, by the use of hoes they dug trenches in the sand at the upper edge of the beach, and then with rakes drew the fish into the trenches and covered them with loose sand. Two days at this work in the immediate neighborhood of Harding Inlet sufficed to clear up things fairly well, while an additional day sufficed for this work on the northern coast. They had not failed, however, during these three days to keep a bonfire burning at the highest part of the cliffs, occasionally wetting it during the daytime to raise columns of smoke, and keeping it burning brightly at night, so that it might serve as a beacon to their friends if, perchance, they had been cast on some lonely island.

They had now reluctantly almost given up all hopes of ever again seeing the absent ones. They feared that both the captain and Hiram had perished in the great storm, and that they must, therefore, continue their life

on the island without them. They had now lived together for so long a time, a happy family of five, that the absence of the two men made a great gap in their little community. As Charley remarked, it was not only that two were absent, but such a two!

It frequently happens in life that we fail properly to appreciate our blessings until we lose them. This had certainly been the case with the three boys. It had seemed so natural for Hiram to look after their comfort, prepare their food, clean and mend their clothes, make for them with his carpenter or cabinet-maker's tools the things they needed from time to time, as well as cheerfully to perform the many services called for, that they had failed properly to appreciate how much he was doing. But now he was absent, they began every day to realize more and more the gap his absence had made in their little community.

But it was the captain whose absence they felt the most keenly. It was the captain to whom they had carried all their difficulties. It was the captain who removed their doubts and gave them advice concerning the many things that were constantly happening. What a wonderful man he appeared to his young friends to be! Much better he was than a walking encyclopedia; for, while an encyclopedia answers one's questions, its answers are given in set phrases. If one understands, all right; but if not, give it up, for an encyclopedia cannot be bothered by stupidity. Now, it was different with the captain. If the boys failed to understand the answers he gave, he was ready to go over them in

another way until the statements became perfectly plain. The boys, therefore, knew they were certain of having their questions intelligently answered when they came to the captain.

But there was something even more than this. They had all learned to love the captain as a father, and never hesitated to bring to him their most private troubles; for they were sure of both sympathy and comfort.

As the days went on without any word having been received from the absent ones, they keenly felt that the chances of their friends being alive were every day growing smaller and smaller. It naturally became a habit after the work of the day was done—and now that they were obliged to do everything themselves, this work called for the greater part of their waking hours —to sit for an hour or so on the porch before retiring. While their conversation related to the work of the day, as well as to the work planned for the next day, it always reverted finally to the captain and Hiram. They seemed to take a sort of melancholy comfort in recalling the things these men had either done or spoken about in the happy days when they were still with them.

As we have said, they had almost given up all hopes of ever seeing the two men again. In truth, however, with perhaps the exception of Harold, each believed, somehow or other, that their friends would finally return. One night, during one of the conversations above referred to, Jack said to Charley and Harold:

"Boys, you must not by any means think I have

given up all hope of again seeing the captain and Hiram. Of course, I know that every day makes the probability of their return smaller, but we must not forget that neither of them is a man easy to down. It is true they have been exposed to a severe storm in an open boat far from land. It is also true they have lost two of their oars, and that their mast and sail have gone overboard. Now, while they may have been drowned by the overturning of the boat, yet if they had any chances of escape they are men who would take such chances. Indeed, somehow or other, I feel sure that we will see them again."

"I hope so, Jack," said Charley. "I never remember meeting a man I loved as much as the captain, nor a finer or jollier man than Hiram. I say, Jack," he continued, "what a splendid leader the captain was. He knew such a lot and, moreover, knew it so as to make the most of it."

"I'm glad, Captain Jack," said Harold, "to hear you say you believe there is a chance of our seeing them again. For my part, I don't understand how you make it out. I'm afraid we shall never see them again," he added.

"Oh, they'll come back some of these days, Harold," said Charley; "cheer up!"

"All right, Charley," said Harold, "I'll try to believe it. I need not tell you it isn't that I don't want to believe it."

Next morning, while the three boys had taken a short cut from the lagoon to the beach across a part of

the reef near Jackson House, that consisted of irregular blocks or fragments of limestone, Jack suddenly slipped and gave his left ankle a severe wrench. At the same time he both cut and bruised the leg against the jagged edges of the rocks.

"Are you hurt much, Jack?" inquired the boys.

"I think not," was the reply. But on attempting to walk he found the pain in his left ankle so severe that he almost fainted. Indeed, he was unable to touch the foot to the ground without severe pain.

"I'm afraid I'm done up for the present," said Jack, bravely smiling. "See if you can't pull me out of this hole. Look out you don't cut yourself on the edges of the limestone. They are sharper than I would have thought possible."

Charley gripped Jack by the shoulders while Harold supported the injured leg so it would not touch anything. In this way they at last succeeded in placing him on the sand at the upper edge of the beach. They then attempted to carry him to the house, one taking the shoulders and the other the uninjured leg, but the pain was so severe that they were obliged to try some other plan.

"Wait a moment here with Jack, Harold," said Charley, "I'll run to the lumber pile and get one of the extra shutters of the portable houses. We can use it as a stretcher to carry Jack to Jackson House."

By the aid of this improvised stretcher they succeeded in carrying Jack to the house, placing him on the captain's bed in the front room.

Although Jack was severely injured and in great pain, yet it was not so much the pain that troubled him as the fear lest the injury would confine him to the room for a considerable time. He, therefore, began reproaching himself for the accident.

"It was extremely awkward in me," he exclaimed. "It is especially unfortunate to be laid up at a time when there are only three of us left on the island."

"Now, don't worry, Captain Jack," said Charley. "Don't bother yourself about thinking how few of us are on the island, but rather thank your stars there are two others with you. Think how much better off you are than if you were alone on the island. Here you have both Harold and myself who will look after you and make you as comfortable as possible. Two nurses," he continued, "for one sick man. Indeed, for the matter of that, I think I should say four nurses, for I do not doubt that Satan may be taught to wait on you and bring you things that you may need when we're away; and even if Satan cannot do this, I'm sure Rompey can."

Charley had good reason for speaking as he did about Rompey, for the intelligent animal seeing that Jack had injured himself, had followed the boys to the room, and stood looking at them as much as to say:

"Is there anything I can do?"

Harold seeing this, commenced petting the animal and said to him:

"You'll watch Captain Jack and see that nothing

hurts him while we are away, and will bring him things when he asks you for them, won't you, Rompey?"

And by the wagging of his tail as well as by his sympathetic barkings, Rompey said:

"I certainly will."

And now how they missed the captain! If he were only with them Jack would be sure to receive the right treatment. But the captain was absent; dead, for all they knew. The responsibility was on them, and they felt it keenly.

As soon, therefore, as they had placed Jack on the bed they went in search of two things. Harold for the medicine-chest they had brought from the brig, and Charley for a book on nursing and the proper treatment of injuries, that the captain, as if fearing an accident might occur to some of them during his absence, had called their attention to; he had also carefully explained to them some simple methods for treating accidents.

Charley soon found and read the brief directions for the proper care of an injury to the ankle. He then handed the book to Jack, and said smiling:

"I know, Jack, it is considered unprofessional for the doctor to permit the patient to know what he is doing, or why he is doing it, but in this case the doctor knows less about the matter than his patient. I remember your telling the captain that you had already taken an extended course in the proper treatment of accidents. I'll ask you to read the directions and see if I'm doing right. If not, tell me just what to do.

Now, Harold," he said, " we must undress Jack so we can thoroughly examine his ankle."

The left ankle was found to be severely injured. Inflammation had already set in, and both the ankle and the parts near it were beginning to swell. Moreover, there were several ugly cuts and bruises where the flesh had been lacerated or injured by the sharp edges of the limestone.

" Now, Charley," said Jack, " you must see first if there are any bones broken. Take hold of the foot and move it gently to and fro listening carefully whether you can hear any grating sounds produced by the broken bones rubbing against one another." As Charley did this Jack nearly fainted from the extreme pain the movements gave him. As Charley was about to stop, Jack replied:

" Don't stop, Charley. Of course it hurts horribly, but if this is not done now, it will be impossible when the swelling has gone on much longer." So the rocking motion was continued with its accompanying agonizing pain.

Fortunately, no grating sounds were heard, so Jack replied:

" Well, that's fortunate. I think there are no bones broken."

" Yes," added Charley; " a sort of modified rapture, as they say in the comic opera of ' The Mikado.' "

" Now, Charley," said Jack, " as there appears to be no fractures of the bones, we must next see if any of the bones or ligaments have slipped out of place—that

is, have been dislocated. Please look at both ankles and see if they are of the same general shape. Of course the injured one is larger than the other, for it is beginning to swell. I mean, does it look as if any of the bones or ligaments had slipped out of place? If so, you must slip them back again."

"Jack," said Charley, examining the injured ankle, "I'm sorry to say it looks as if there is a dislocation."

"Then," said Jack, "give a steady, strong pull to the foot while Harold holds the leg. It'll hurt awfully, but it must be done."

Charley gave a steady but strong pull when, at last, the dislocated bones slipped into place with a little snap, and the ankle took the same general shape as the other. The pain during this operation was so severe that Jack actually fainted, but soon regained consciousness.

"Now," he said, "get some hot water and bathe the ankle. Harold, while Charley is doing this, look in the medicine-chest for some rolls of bandages."

"I know," said Harold, "they are bands of muslin. Here are several about an inch wide. I judge from their size and weight that there are from ten to fifteen feet of muslin-strip in each bundle."

"Take two or three of these bundles and put them in a pan of boiling water and boil them thoroughly," said Jack to Harold.

"What's that for?" inquired Harold.

"To sterilize them," was the reply. "They have been so long on the brig, or on the island, that they may have become infected."

"But they are marked sterilized," said Harold.

"Yes, but then they may have become infected since. Remember the awful air of the cabin from the doctor's specimens."

The ankle having been thus treated, Charley proceeded to wash the bruised part of the leg, removing the blood, and then taking a bottle from the medicine-chest labeled "Corrosive Sublimate Tablets" and marked "Poison," he dissolved one of them, under Jack's directions, in a large bowl of water, carefully washing the cut parts and then pouring some of the liquid over the same.

"I know what that's for," said Harold. "It's to kill any of the little animals that might get into the cuts from the dirt or air when, rapidly breeding, they would make the wounds fester."

Jack now directed Charley how properly to bandage his ankle, following some very plain drawings in the book showing how this was properly done.

"Now," said Charley, when everything was completed, and Jack was comfortably placed in bed, "we have done all we can, Jack, and the hardest work remains for you."

"What do you mean?" asked Jack.

"Why, what the book says about the necessity for absolute rest on the part of the patient. Shall I read it to you?"

"Oh, no," said Jack smiling, "that's nearly the first thing I read when you handed me the book. It was what I most dreaded. Here it is," and Jack read as

follows: " ' But above all, it is absolutely necessary that the patient be assured complete rest. Any attempt to use a badly sprained ankle too soon may result in permanent lameness.' "

" Never mind, Jack," said Harold, seeing that the prospects were causing him great worry, " we'll manage to pull through somehow or other. Besides," he added philosophically, " there's no good in worrying; it won't make your ankle get well any sooner. On the contrary, it may keep you longer in bed."

As a result of the accident but two of them were able to be on their feet, and these the youngest.

But their troubles were by no means over. Early next morning, while Harold and Charley were preparing breakfast, Charley was worried by the flushed appearance of Harold's face. Without letting him know what he was doing, he felt Harold's hand. It was much hotter than he had ever before known it to be. Without saying anything they finished the preparation of breakfast, taking the food into Jack's room, where they ate together. When they had finished eating, Charley, turning to Harold, exclaimed:

" Why, Harold, you have eaten nothing. Do you feel sick? "

" I don't feel hungry," was the reply; " and I have a bad headache."

" I think Harold has a little fever this morning, Jack," said Charley.

" That's so," said Jack, anxiously feeling his hand. " I hope you are not going to be sick."

"Oh, I guess I am all right," replied Harold, "but let me tell you the wonderful dream I had last night."

"All right, Harold," said Jack anxiously, "let's hear it."

"I dreamed," replied Harold, "I saw boat No. 23 lying on the reef of a small coral island. It was a little bit of an island, not more than a mile or so across. The lagoon had been filled with sand. There were no cocoanut palms, and the land was so low that I think it would have been nearly covered by the water at high tide."

"Did you see the captain and Hiram on the island?" inquired Charley eagerly.

"Yes, they were both there, but looked hungry and worried. They had apparently just finished eating something they had taken out of the boat. I noticed particularly that the boat had lost its mast, and only had one oar. The captain was talking to Hiram, and seemed greatly worried about something. Just as I drew near and tried to hear what they were talking about I awoke."

"There, now," said Jack, "that's a good sign, anyhow, Harold."

"Yes," said Harold, "and I hope it'll come true. Charley," he continued, turning to the younger of the two boys; "if you don't mind, I'll not help you with the work for an hour or so. My head aches so badly that I feel quite dizzy when I get on my feet. I think I will lie down for a few minutes."

"All right, Harold," said Charley, "you'd better

take a little nap. Maybe you'll feel better when you get up."

But instead of growing better, Harold rapidly grew worse. At the end of an hour he became delirious. His mind was evidently running on the dream that he had had, for they heard him say:

"Uncle Arthur, if you had another oar, or could rig up another mast and sail, you and Hiram could bring the boat back to Harding Island, which lies over in that direction," and then apparently losing all memory of his previous conversation, he would say pleadingly to the men: "Please come back to Harding Island! You do not know how much we miss you!"

There was a clinical thermometer in the medicine-chest, a form of instrument suitable for taking the temperature of the human body by the introduction of the bulb into the mouth or other cavity. This form of thermometer is so arranged that as the mercury rises in the tube, on exposure to a higher temperature, it does not return to the bulb as in the ordinary thermometer, and thus making it possible to note the highest temperature to which it has been exposed.

The thermometer showed that Harold's temperature was one hundred and one and one-half. Though not very high, yet his condition gave them much anxiety.

CHAPTER XXVI

CAPTAIN CHARLEY. AN IMPROMPTU COMIC OPERA

CHARLEY was now the only well person on the island, and was therefore kept very busy attending to outside matters, in cooking, as well as looking after the many calls of the two persons he was nursing. Jack's ankle required no little attention, but, knowing how busy Charley was, Jack himself attended to as much of the bathing and dressing as was possible. Harold required more care. His temperature had risen to one hundred and two and one-half. At times he was quite delirious. He would then imagine himself at home, and would enter into long conversations with his parents, telling them of the many adventures he had had both on the derelict brig and on Harding Island. It touched Charley very much to hear how frequently in these conversations Harold would tell his parents about the splendid young lad they had picked up in an open boat at sea, and how much Harold had become attached to him. During other times, in his delirium, he imagined he was with Captain Harding and Hiram, and would hold long conversations with them.

It was a curious fact that in all his conversations with the captain and Hiram he never appeared to forget that both these men were away from Jackson House. He seemed to think that somehow or other he

had left Jackson House, and had gone to them for the purpose of persuading them to go back with him.

"Please come back!" he would plead. "You can't imagine how much we miss you. Besides, Jack's ankle is very bad, and I know that both Charley and Jack are uncertain whether they have attended to it properly. I say, Uncle Arthur," he would repeatedly inquire, "do you think this hurt will lame Jack for life? That would be awful, wouldn't it? So please come back with me at once."

Rompey was greatly affected by this condition of his young master. He spent nearly all the time near Harold's bed constantly watching him. Every now and then he would look up at Charley or Jack shaking his tail and making little whimperings as if to say:

"Won't you please do something for him? Why don't he speak to me? He looks straight at me and never says a word. Have I been doing anything that has made him angry with me?"

It was this phase of Harold's sickness that appeared to give Rompey the greatest anxiety; for, though Harold looked straight at him, yet he apparently failed to recognize him. Every now and then during the restlessness of the lad, when he would throw one hand over the side of the bed, the dog would gently lick the hand in a vain endeavor to have his young master notice him.

Charley was frequently obliged to leave the room to prepare food, get cool water, or climb the nearest cocoanut palm for fresh cocoanuts, the cool milk of which

was refreshing to both his patients. Jack had asked Charley to move his bed close to Harold's, so he was able to do many little things for the sick lad, such as to give him his medicine, especially to give him a drink of water, for which he was almost constantly asking. Jack was able to get these things without getting out of bed, because Charley had placed a small table close to the other side of it.

It was indeed an anxious time. They were so fearful they were leaving something undone that should be attended to, that they eagerly read and reread all they could find in the medical book about fevers. But there were unfortunately so many kinds of fever, and their symptoms were so uncertain, in most cases requiring many days of sickness before they could be properly recognized, that they were unable to make head or tail out of the directions. They were consequently greatly worried, but being boys with plenty of common sense, they wisely concluded to do nothing for Harold beyond giving him the simple remedies the captain had employed during those very few occasions when they had been somewhat unwell.

Fortunately, Harold soon began to mend. There were great rejoicings at Jackson House when this happy condition was reached. Nor were these rejoicings limited to Jack and Charley. Satan and Rompey, especially the latter, were exceedingly demonstrative in showing their delight at Harold being able to recognize and speak to them.

The first thing Harold said when he regained con-

sciousness was to inquire of both Jack and Charley in an anxious manner:

"Have the captain and Hiram come back yet?"

They greatly feared when this question was asked that the disappointment would act unfavorably on Harold's convalescence. They had the good sense, however, to reply immediately, and in as nearly an unconcerned manner as possible:

"They haven't come back yet, but we're hoping they'll be here before long." And then they immediately tried to think of something that would take Harold's mind off this question. Fortunately, Rompey came to the rescue. Observing that his young master had recognized Jack and Charley, he stood gently resting his two paws on the side of the bed and looking eagerly into Harold's face, and by tail shakings and whimperings to beg notice from him. Harold, seeing this, said:

"Hello, Rompey, where have you been all this time? Good dog, come here."

It was unnecessary to say that both Jack and Charley were delighted that Harold's attention had thus been momentarily taken from the absent ones and transferred to the animal, so they both took their part in speaking to and petting the dog.

But Satan, becoming jealous of Rompey receiving so much attention, flew from the edge of the table near Jack's bed, on which she had been resting, and looked toward Charley, cocked her head to one side, and began crying:

" Something to eat here! "

Satan's remarks appeared to be so appropriate that Harold began laughing, saying to Charley:

" Satan is not as stupid as she looks. I am awfully hungry. I feel almost starving," he continued, in the manner so characteristic of those who are recovering from spells of sickness during which they have eaten little or nothing. As Charley was going out of the room to get something to eat, he continued: " Wait a moment, Charley." And turning to both boys he inquired: " How long have I been sick? "

" For three whole days," was the reply.

" That's very astonishing," he said, " I don't remember anything about it, except that several times I thought I had returned home. On several other occasions, I thought I had visited the captain and Hiram on the same lonely island I dreamed about just before I grew sick."

Harold's convalescence continued without any setback. There was one thing that had certainly improved, and that was his appetite. They had become so alarmed at reading about the necessity for feeding a patient during recovery from typhoid fever on soft, easily digestible foods, that they would not let Harold have any solid food for some time.

" Why," complained Harold good-naturedly, " I couldn't have had typhoid fever. The books say one never gets over that for six weeks from the time the sickness begins."

" That's true," replied Jack, " but the book also

speaks about a kind of typhoid fever called 'walking typhoid fever,' during which the patient although unwell and uncomfortable, is able to remain out of bed during most of this time."

"Oh, come, Captain Jack," replied Harold in a jollying tone, "do either you or Charley remember any time during the five or six weeks before I went to bed when I was either unwell or had lost my appetite?"

"We do not," cried both boys with a shout, ending in a laugh. "No, Harold, we certainly do not remember your ever having lost your appetite during the time to which you refer."

"Then, Jack," pleaded Harold, "can't I have some solid food?"

"Harold," replied Jack, "don't let's take any risks, so be sensible and eat some soft food."

"All right," said Harold, "I will. I say, Charley," he continued, turning to that person, "you're cook; can't you get me up something that is jolly nice? Do you think you could make a rice pudding?"

"Yes," said Jack, anxious to encourage Harold, "I'd like to eat some rice pudding myself."

"I don't know," said Charley. "I know how it tastes and what it looks like, and what it has in it, but just how it is made I must confess my ignorance. However, I'll try."

"What has it in it?" inquired Jack in good-natured raillery.

"Rice, sugar, milk or cream, and if you can get it, a little dash of nutmeg."

"Well," was the reply, "all those articles are among our stores. We brought so many air and water-tight packages each containing ten pounds of rice, that I have often wondered what we could do with them all. I know too, there is plenty of sugar. As to the milk and cream you can get them from the cocoanuts, and as for the nutmeg, if you haven't any you'll have to do without it."

"But there are plenty of nutmegs," replied Charley. "I remember seeing one in a little tin nutmeg grater I was looking at in the kitchen only yesterday, and several dozen others in a bag."

As Charley was leaving the room, Harold said:

"Please make plenty, Charley. I'm awfully hungry. If I can't have solid food, let me have as much soft food as I can eat. I guess, Jack, you won't object to that, will you?"

"I think," said Jack laughing, "you can have it often but not too much at a time."

"Well," said Charley, getting ready to leave the room, "I'm off. I'll do my best."

"Let me see," said Charley to himself when he reached the kitchen. "I remember the rice puddings Hiram used to make. They were certainly splendid. He brought them to the table in a two-quart dish. I wish I had watched him carefully when he made it, but I was in such a hurry to go with Harold to the swimming-pool that I didn't stop to watch. But then it ought to be a simple matter. Rice pudding only contains three things; rice, sugar, and cocoanut milk. I

don't count the nutmeg. That can be put in after the whole thing is cooked."

So Charley commenced to get ready. Getting out a ten-pound box of rice, and plenty of sugar, he opened a number of cocoanuts and extracted the milk. He also got a lot of cream by scraping a few somewhat unripe fruit.

"Now," continued Charley to himself, "how much rice shall I use. Let me see. Harold wants me to make a big pudding, so there will be enough to eat. I know Jack likes it, and so do I, and then Rompey and Satan will be disappointed if I don't give each of them a good dishful. I think I'll make enough to fill a four-quart pan, so as to leave enough over for to-morrow. There's no trouble about the milk and cream, since I can't put any more in the pan than it will hold, and when it cooks off I will add more.

"And now I wonder how much rice will be needed. I guess I'll take enough to little more than half fill the pan. Say I use two and a half quarts," which Charley proceeded to measure out. "I wonder," he continued, "whether it is necessary first to boil the rice. I guess it is. Anyhow, I'll boil it first in water and then in milk and cream. Let me see; what shall I boil the rice in? I know; this four-quart boiler will be just the thing. It is certainly big enough to boil two and a half quarts of rice." So Charley put it on the fire, barely covering it with water and milk, which was soon brought to a boil.

"I'm not going to have this rice pudding spoiled by

burning. A burnt taste is so disagreeable." He was, therefore, careful to stir the rice in the boiler every few minutes.

"Gracious how the stuff is swelling," said Charley, noting the great increase in the volume of the rice. "I'll have to add more water and milk. The rice is now almost dry."

He added the water and kept on stirring, but the rice kept on swelling in a most amazing manner. It actually swelled so that it rose to the top of the four-quart boiler, and was beginning to boil over and fall on the stove.

"Looks as though I had cooked too much," said Charley. "But I ain't going to waste it."

Fortunately there were a number of these gallon boilers on the brig, and Hiram had put them in the kitchen for cooking.

"I'll ladle some of this stuff out into another boiler," he said, which he did.

But in order to keep the stuff from burning, he was obliged to add water and milk to each of the boilers every now and then.

"Well," said Charley, "this certainly surprises me. The wretched stuff is continuing to swell."

It did, indeed, for now both pots were filled with rice and beginning to boil over on the fire.

"Gracious," said Charley, "I'm not going to be beaten this way. I'll use two other pots," and soon there were four pots of the boiling, seething mass, with Charley rushing frantically from pot to pot stirring

each with a large spoon to prevent their contents from burning.

In the meanwhile Jack and Harold, who heard Charley running about the kitchen, for their room was almost immediately over it, began to wonder what was going on. So Jack called out:

"What's the matter, Charley? How's that rice pudding coming on. You won't forget to cook enough, will you?"

"Oh, no," said Charley grimly; "I'll cook enough all right."

"Take care," said Harold, "I smell something burning."

"So do I," said Charley, "but never mind, Harold, I'm making a wonderful pudding down here. I'm sure both of you would be surprised if you could see it. But please excuse my not talking any more. The rice pudding requires all my attention," cried Charley, frantically rushing from pot to pot.

"I wonder what's up," said Harold to Jack.

"I don't know," replied Jack laughing, "but I think I can guess. Whatever it is, however, Charley is taking gymnastic exercise along with the cooking. Listen how he's rushing around."

"Jack," said Harold, "ask him straight out what's the matter."

"Charley," called Jack, "tell us what's the matter."

"I'm not sure," answered Charley, "but I think some one has been playing a trick on me, and has molded baking powder into grains resembling rice."

"What makes you think that?" inquired Jack, beginning to laugh, being pretty sure he knew what was the matter.

"Why, the wretched stuff swells so. I put the rice in a four-quart boiler, but it began to swell so much it filled that and another four-quart boiler. The swelling has kept on until I can't manage it, although I have four full four-quart boilers holding it, and I'm thinking of adding two others, for I don't intend to lose any. You asked me to cook a lot and I'm cooking a lot, and you've got to do your part toward eating it."

"I'll eat my share," said Harold, "I'm not going back on the cook, Charley, after he has taken all this trouble."

"I say, Charley," called out Jack, "how much rice are you cooking?"

"Oh, only a full two and a half quarts," was the reply. "I thought I had better be sure to have enough."

At this both boys burst into loud laughter. They had both watched Hiram making rice pudding and cooking rice often, and knew that at the most, for a good-sized pudding, three or four tablespoonfuls of rice would be plenty. Of course, it would be necessary to add large quantities of water, or preferably milk, while the rice was cooking, and that made a rich custard with the rice greatly increasing the bulk.

When Charley learned how great a mistake he had made, he began to laugh good-naturedly, saying:

"I'm beaten this time. I guess you'll have to make

out with boiled rice and sugar served with cocoanut milk and a dash of nutmeg. But I promise to prepare for you to-morrow a first-class pudding if both you and Jack will put your knowledge together and tell me just how to go about it."

The combined knowledge of the other two boys resulted in the following recipe for what they agreed to call "Harding Island rice pudding." It was as follows:

Place in a two-quart pan about four tablespoonfuls of rice. Add two cups of sugar and enough milk and cream nearly to fill the pan. Place in a hot oven for two hours and stir occasionally, adding milk and cream from time to time to supply that boiled off. When nearly done flavor with grated nutmeg to taste. Serve either hot or cold.

Charley put his whole mind on the preparation of this *chef-d'œuvre.* It was so great a success, indeed, that they chaffed him, saying he must certainly teach Hiram how to make Harding Island rice puddings.

Harold's convalescence continued satisfactorily, so they all felt in an extremely joyous mood.

One afternoon, shortly after Harold's convalescence, Charley, who had been absent from the sick-room rather oftener than usual, informed Jack and Harold that he had prepared a surprise for them in order properly to celebrate Harold's recovery and Jack's evident bettered condition.

"All right, Charley," said Jack, "I'm sure a little fun now will help all of us."

After an early dinner, Charley gravely handed not only to Jack and Harold but also to Rompey and Satan an invitation written on separate sheets of paper on which the boys read the following:

GRAND ENTERTAINMENT

in the Sick-room at Harding Island, Thursday, 2 P. M.

CAROLA, THE WONDERFUL AUSTRALIAN WIZARD AND SWEET WARBLER

Will Give an Exhibition of His Marvelous Powers at the Above Place and Time.

Come Early if you Want a Good Seat.

The boys laughed as they read the announcement. Rompey looked at his gravely and, concluding that Charley wished him to take care of it, wagged his tail and looked up at his young master as much as to say:

"I'll watch it all right. No one shall take it from me."

Satan, however, trying to eat hers, and finding it unpalatable, remarked:

"Nothing to eat here!"

"Charley," said the boys, "when is this wonderful exhibition to come off?"

"As soon as the janitor fixes the room," was the reply.

"Who's the janitor, Charley?"

"I am the janitor," said Charley gravely.

The fixing of the room consisted in placing two chairs on the floor in front of Jack's bed, and a chair

that had been placed in front of Harold's bed and on which he was now sitting.

"The entertainment will begin in a few moments," said Charley. "The audience is requested to pay especial attention to the announcer, so that they may better know what is going on."

"Who is the announcer?" inquired Harold laughing.

"I am the announcer," said Charley seriously.

You may talk about your lightning-change artists in the vaudeville entertainments. Charley could equal any of them. For almost immediately the janitor became the announcer, and Charley appeared clad in the cast-off uniform of the captain. It was ragged and not altogether too clean, but the bright, animated face that shone through it made it all right. Charley gravely announced the following:

"The Sweet Warbler will now present to you the celebrated Carola from Australia, who will take the leading part in a new comic opera written especially for this occasion. He will be aided in this work by the famous invisible singers, who will take seats on the two empty chairs you now see before you."

Another quick change of costume and Charley appeared dressed in a fantastic garb, consisting of a drapery formed of the calico prints. He pretended to lead into the room the two invisible celebrated singers he had referred to, and whom he introduced as the "New Cook and the Scullion Maid."

"Cook, take a seat on my right, please, and the

Scullion Maid the seat on my left. The announcer," he said gravely, " failed to let you know that the name of the new opera is the ' Harding Rice Pudding, and How it is Made.' "

Then followed a number of ludicrous songs describing some of Charley's troubles in the preparation of the first pudding, together with minute instructions to him from both the Cook and the Scullion, the former lady appearing to be especially anxious about the amount of rice used since, she declared, they would suspect her of stealing it, while the Scullion's instructions were not to dirty so many pots and things since she would have to clean them.

The curious part about the play was the wonderful skill with which Charley was able not only to change his voice, but also to make it appear to come from the invisible cook or her invisible aid on the two chairs. Charley possessed marvelous skill as a ventriloquist, so that when he made the invisible figures apparently speak or sing, it caused great astonishment on the part of Jack, and much amusement to Harold.

Rompey and Satan appeared somewhat frightened at hearing voices they could not see, and on several occasions Rompey rushed toward the chairs barking and, being unable to see any one there, would come back and, shaking his tail, would look up in Harold's face as much as to say:

" I don't understand it, but since you are apparently not frightened I guess it's all right."

When they came to part second on the programme,

Charley, as announcer, declared that the Australia Wizard would now appear in his wonderful character of "Rambolan, the Hindostanese Magician." In a few moments he reappeared completely naked except for a flowing mass of printed calico around his loins. His entire body, however, was almost completely covered with the suns, moons, stars, comets, and other heavenly bodies, together with squares, triangles, and circles, which had been transferred from the highly colored calico prints before referred to.

Charley, who possessed great skill at slight of hand, was able to make articles appear and disappear in a wonderful manner, apparently from and into empty space. He called special attention to the fact that he had concealed nothing up his sleeves, which indeed was evident, considering the nude condition of all his body except his loins. He had, however, ingeniously employed the covering at his loins to hide the various articles when they appeared and disappeared.

Much of the fun of this part of the programme was due to the wonderful changes in the expression of Charley's face. As the various articles rapidly appeared and disappeared, he made it express surprise, astonishment, fear, and amazement. He was so successful in this that he kept Jack and Harold in an almost continuous roar.

Part three of the entertainment was a display by the Australian Wizard of his wonderful educated animals. Here both Rompey and Satan performed a number of very clever tricks Charley had privately taught them.

" Charley," remarked Jack, " I had no idea you were good at sleight of hand and ventriloquism. How is it you never told us about this? "

" Oh, I never thought it worth while," he replied. " Harold, however, knew all about it, but I persuaded him to keep quiet, for I wished to see if I could not surprise you some day."

" Well," replied Jack, " you certainly have surprised me, and have given us a splendid entertainment."

CHAPTER XXVII

The Bottle on the Beach. Harold and Charley to the Rescue

Harold had now been up and around for several days. Owing to his general excellent health he was soon able to take his full share of the work that, during his sickness, had fallen on Charley.

There was one point that had given Jack much uneasiness during the time Harold had been confined to his bed. Since all the work then fell on Charley, it was, of course, impracticable for him to visit either Harding Channel or the site of the bonfires on Parker Cliffs. There had, therefore, been nearly a whole week during which the fires had ceased to burn. The column of smoke by day and the pillar of fire by night had no longer stood a welcome beacon for their friends, assuming that, perchance, they might be living and within sight of two such prominent signals.

"Charley," said Jack, one morning after Harold had recovered sufficiently to do his share of the work for two days, "I think you had better go to-morrow to Harding Channel and Parker Cliffs and start the fire again, and then make a careful examination of the beach on the northern shores of the island."

"Shall I take Harold with me?" inquired Charley.

" I would almost be afraid to leave you alone, for there is no telling what might happen."

" What do you say, Harold? " inquired Jack.

" I would like very much to go with Charley, but I think I had better stay here with you, Jack," was the reply.

" Very well," said Jack. " Charley, you had better take Rompey with you. I think he'll help you considerably in looking around."

The arrangements were soon made, and Charley starting off in boat No. 13 reached Harding Channel in due time. There was so strong a tide running in that he had some little trouble in reaching the ocean on the northern shore of the channel. The disagreeable odor from the decomposing fish had now entirely disappeared. Anchoring the boat Charley soon reached the top of the cliffs and started a fire for the day. He then laid another fire which he intended to touch off when he left on his return to Jackson House.

It was natural that after lighting the fire for the day, Charley should stand for a moment looking over the waste of water that lay between him and the place where the heavens seemed to touch the ocean on the northwest horizon. Somewhere in this direction he thought it was possible the absent ones had found a temporary shelter on a lonely coral reef. The fire had now commenced to burn brightly, so partially quenching it with water, he stood for a moment watching the tall column of smoke as it rose almost perpendicularly in the still air.

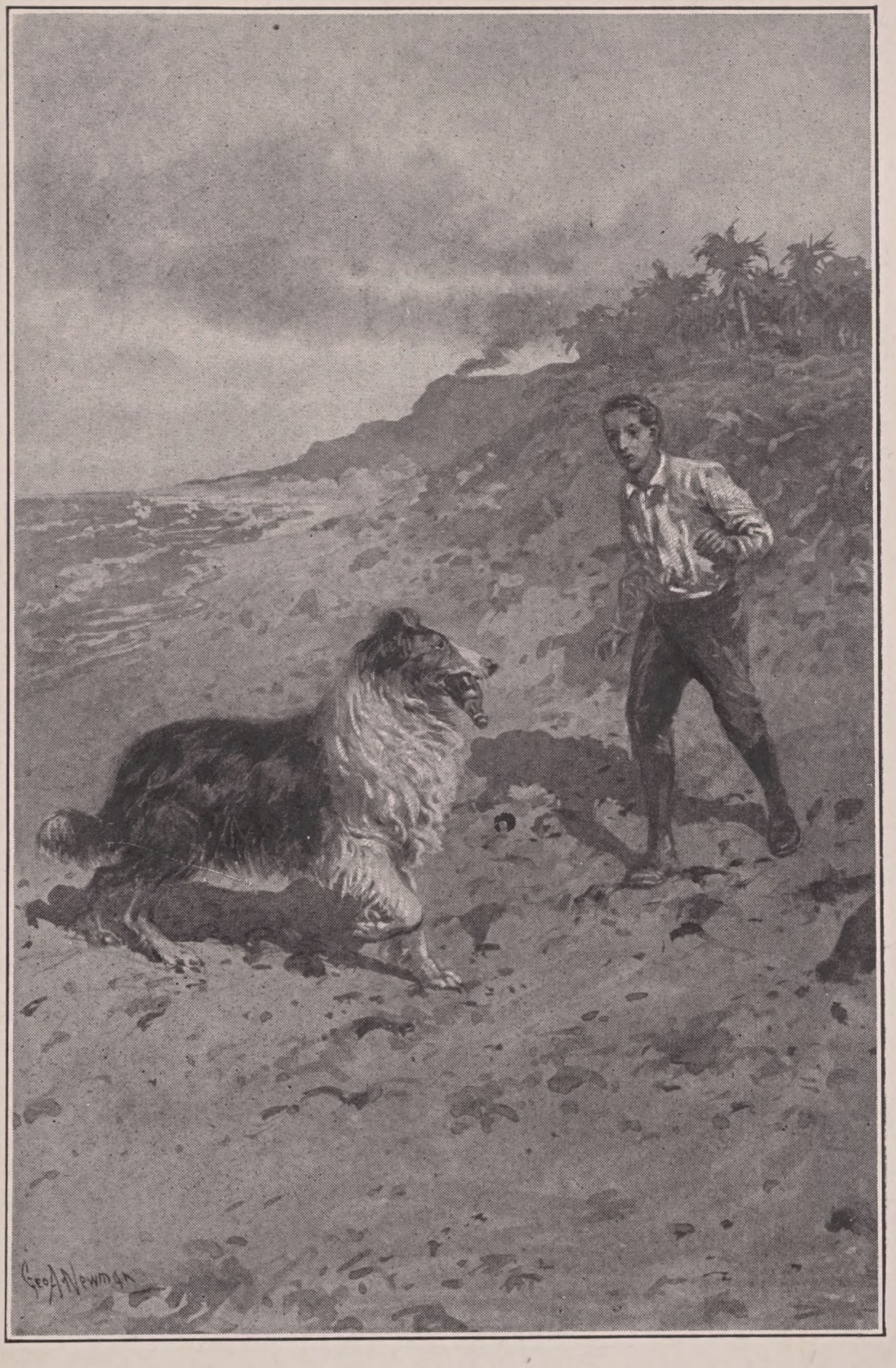
"They may be able to see it," he thought. "If so, it will at least give them the information as to the exact direction of Harding Island, and will let them know that we are still here. I wonder," he added, "what they'll think at the absence of the smoke and fire while I was obliged to remain at Jackson House to look after Jack and Harold?" He stood a while musing, and then turning to Rompey, said: "There is nothing more for us to do here, Rompey, until we return. Let's descend to the ocean and make a search of the coast on the northeastern and northern coasts of the island. I wonder," he added to himself, "what Captain Jack thinks I'll find there."

The wreck of the coral-encrusted brigantine was now lying high and dry on the beach, for it was low tide. Thinking the opportunity of examining the vessel too good to be lost, Charley succeeded in penetrating the mass of now dead corals in the neighborhood of the forecastle, which he entered. Some of the planks forming the roof had been washed away, so that the room was well lighted. Nearly everything it had originally contained had either been washed away or had disappeared long ago. In one corner, however, he discovered the coral-encrusted skeleton of a human being. It was evidently that of a man, for a single boot, remaining on one of his feet, was the only article of dress that had survived the long time that had passed since his death. An open-face watch, however, was lying near the right-hand side of the skeleton, where it had apparently fallen when the vest, in

which it had probably been placed, had rotted away. The watch was covered with a thin but air and water-tight coating of coral rock that had preserved it from decay. For some reason or other the deposit of coral on the glass face was so thin that the hands of the watch could be distinctly seen. They had stopped at twenty minutes past twelve, probably on the day the brigantine was wrecked, so many, many years before.

Picking up the watch as something to show Jack and Harold, Charley proceeded along the northern coast of the island. When he had gone quite a distance from Parker Cliffs he began to see undoubted signs of the absent ones. Here and there, washed up from the sea, fragments of the kinds of food he remembered had been placed in the boat on which the captain and Hiram had been when they disappeared in the storm, were to be seen lying on the sand of the beach. There were several corks which Charley recognized as being the same as those in the bottles of port wine that had been placed among the food supplies.

"Now I understand," said Charley to himself, "what Jack hoped I would find. I will take some of these things to Jackson House. They have been carried by the same current that brought to us Harold's cap, the oars, mast, and sail of boat No. 23. When Captain Jack, Harold, and I were last on this portion of the coast there were no signs of these things. It is evident, therefore, that Captain Harding and Hiram are somewhere toward the northwest and, moreover, were alive long after the storm."



"Rompey outran the lad, and in a few moments returned carrying in his mouth an empty but sealed bottle."

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Charley, however, did not stop here, as he intended to make a further examination of the coast. When he had proceeded for about two miles farther to the west, Rompey suddenly began barking in a tone that Charley knew meant that he had seen something that pleased him, for turning around and looking at Charley as if to say:

"Come with me, I want to show you something I see beyond us."

He ran rapidly further up the coast, followed by Charley. Rompey, however, outran the lad, and in a few moments returned carrying in his mouth an empty but sealed bottle, and placing it at the feet of his young master looked up at him and wagged his tail as if to say:

"What have you got to say to this? Am I not a clever dog?"

Charley did not stint the praises that he gave to Rompey, but exclaimed:

"Doubtless this contains a letter from the post-office of the sea. That it is from the captain and Hiram I have no doubt, for I recognize it as one of the bottles they had with them. However, there's no use in guessing. I'll open the bottle and look."

Sure enough the bottle contained a long letter signed by the captain and Hiram, saying that they had been cast on a small island where they could hardly get enough food and water to sustain life, and asking the boys, or any one else finding the bottle, to come promptly to their aid. But since this letter will be read

aloud by Jack as soon as Charley hands it to him, we will wait until then to learn its exact contents.

Charley had read enough to learn that the captain and Hiram were in need of instant aid, so he started at once on a rapid walk toward Parker Cliffs. Here he set fire to the pile of combustibles he hoped would burn the greater part of the night, and returning to the boat was soon rowing rapidly toward the landing at Jackson House, where he found Harold waiting to receive him.

"Have you had any luck?" exclaimed Harold. "Have you any tidings of the captain and Hiram?"

"I have, indeed," cried Charley, triumphantly holding up the bottle. "This bottle contains a letter telling us all about them. They were still alive when the letter was written. They are now in a dangerous position, so let's hurry up, show the letter to Jack and have him read it aloud to us."

"What's the matter, Charley?" inquired Jack, as soon as the two boys entered the room. "Did I not hear you say you had found in a sealed bottle on the shore a letter from the captain and Hiram? Then they are still living?"

"Yes, Jack," said Charley; "here is the letter. I found it sealed in this bottle lying on the very part of the coast you asked me to examine. But read it quickly. I have read enough to know that the captain and Hiram are in need of instant help. How splendid it will be if we can reach them and bring them back to Harding Island."

Jack took the letter and, opening it, eagerly read the following:

Two and a half days from Harding Island toward the northwest.

My Dear Boys:

The storm that suddenly separated our boats carried us toward the northwest for two and a half days. We tried hard to return to the island, but finding it too dangerous continued drifting with the wind.

We have lost all our oars except one. Our mast and sail were swept away, and our boat, becoming unmanageable, was nearly swamped when we fortunately reached a lonely island of only a mile and a half by a mile in extent. Fortunately, there is a little water on the island and plenty of fish, so that with the provisions we had in the boat we have managed to live so far. Our foodstuffs, however, are rapidly decreasing, and we are now on rations. Indeed, were it not for turtles' and birds' eggs, of which there are unfortunately only a few on the island, we would now be nearly without food.

Hiram and I have come to the conclusion that there is a strong ocean current setting directly toward Harding Island; for we have kept the bearings of that island. I am sending this bottled letter in the hope that it may reach you. It is now more than a full week since the storm separated our boats.

We are in great danger on this little island. Only a few parts of its surface are as high as ten feet above the water. Should a storm occur, as may happen at any moment, we would probably be swept into the ocean. Come to our aid as quickly as possible in boat No. 13. Bring plenty of provisions and fresh water. God bless you all.

(Signed) Capt. Arthur Harding,
Hiram Higgenbotham.

And then, as if they appreciated the fact that the letter might fall into the hands of some vessel, the captain gave, as nearly as he could, the latitude and longitude

of both Harding Island and the lonely islet on which they had been cast, stating that two men, one an Englishman and the other an American, together with three lads, two from England and one from Australia, had been cast upon a large coral island. That, during a severe storm, the boat containing the two men had been blown out to sea, and that they were now in a position of great danger on a lonely coral islet. He urged any one finding the letter to hasten to the rescue of the men as well as to take the boys off the island. As regards the position of Harding Island the captain had come to the conclusion that it was an island of the Paumotu Group, situated in latitude —S., and longitude —W. from Greenwich.

There was much excitement in the sick-room when Jack had finished reading:

"Hurrah!" cried Jack. "They are, I believe, still alive."

"We will probably find them still alive if we reach them as quickly as is possible," said Charley.

"Two days and a half from Harding Island," said Jack, "our signals could not be seen by them, could they?" he said to Charley.

"Certainly not," was the reply.

"How unfortunate it is," said Jack, "that I am bedridden at such an important time. Charley, don't you think you and Harold could put me in the boat so that we could all go to the rescue of the captain and Hiram?"

"No, Jack, I don't. You know how badly the boat

gets shaken when the waves are high. You would not only be taking a great risk in doing this, but would be so much in the road that you would hinder rather than help us. Of course, we would like to have you with us. On such a trip we will need all the advice and help we can get. It's bad enough to be obliged to leave you alone, but two and a half days in an open boat is too much for me to try without help, so that Harold will have to come with me."

"Never mind leaving me alone," said Jack, "you can prepare enough food for me for several days, leaving it where I can easily get it. Besides," he said, "you know I can move around a little now by the use of the pair of crutches you made me the other day. They are not much to look at, but they'll be a great help now I can safely be a little on one foot. Of course," said Jack, "you'll leave Rompey with me. With his aid I think I can get along very well."

"Come, Jack," said Charley, "let's determine what we shall put in the boat so that we can start early tomorrow morning. We'll leave plenty of food and water for you, and I think that Rompey will be able to take good care of you."

"Very well, Charley," said Jack. "It's hard for me to remain here and see you and Harold leave on a long ocean voyage in an open boat. The desperate condition of our friends, however, certainly warrants your taking the risk, so get everything ready as soon as possible. Nevertheless, take enough time to see that nothing is left that might be needed."

Charley and Harold had everything ready for starting early the next morning; for it was not much after midday when Charley had returned to Jackson House with the sealed letter. Bidding Jack good-bye, and telling Rompey to remain to take care of him, they pushed the boat off and were soon making good headway for Harding Channel.

The tide was still running out, so they had no difficulty in passing through the channel, and were soon pulling the boat with a steady stroke toward the northwest. At Jack's suggestion, they had taken in the boat the broken masts, together with the materials for new sails, as well as the oars they had picked up at sea, and had also included such of Hiram's tools as they thought he would need should it be possible to repair boat No. 23 and bring it back with them.

It was a long voyage for boys so young to make in an open boat. Fortunately, during their entire time on the water, the weather was characteristic of that wonderful calm that has given the name Pacific to this great body of water. There were few or no waves, so that they could easily keep the boat steadily moving toward the northwest.

Of course, the boys knew that it would be very easy to pass by so small an island. They, therefore, kept a constant lookout for it. On the second day, several hours before sunset, Charley, turning to his companion, remarked:

"Harold, I think I can see a dim speck on the horizon directly over our bow."

"Yes, Charley," said Harold, "that's right. I hope it's the island we're looking for."

They rowed the boat steadily toward the dim speck. But distances are often extremely deceptive on the sea, especially during the remarkably clear weather they were then having. Although they rowed straight toward it, several hours passed before the island began to show clearly above the water. At last they came near enough to see it. It looked like a mere speck in the great deep as, indeed, it was, and appeared to be almost surrounded by breakers. As they drew still nearer they saw two men they recognized as the captain and Hiram, the latter of whom was expressing his joy at their appearance by an impromptu dance on the sand.

"Island, ahoy!" shouted Charley. "Show us the safest landing-place."

"Boat, ahoy!" was the reply, and the one they recognized as the captain, pointing their boat to the right of a line of breakers, shouted: "Bring her in through that opening. You'll find deep water there."

In a few moments the boat had passed through the opening indicated, and had safely landed on a small coral beach. In a few moments the two boys were in the embraces of the captain and Hiram.

"Thank God, boys," said the captain, "you have come. We are nearly starved. There was unusually high water yesterday, and the island was completely covered by water. We can get no fresh water on the island, and most of our food was ruined by salt water.

Had it not been for our boat, that still floats, we should have been drowned. What food have you on board?"

"Plenty of food and fresh water," replied Charley, so they were soon breaking their long fast.

"But where is Jack?" was the question speedily asked by the captain.

Then Charley briefly gave an account of what had occurred on Harding Island during the separation, and the captain had additional cause to be grateful to Him who has even the islands of the sea in his care.

CHAPTER XXVIII

A Happy Reunion

When Hiram saw in the boat the broken mast and the materials for a new sail, he remarked:

"Onless ye hev brought my tools I kain't do much with them things."

"But, Hiram," exclaimed Charley laughing, "we have brought all the tools we thought you would need. Jack was very particular about seeing that this was done."

"That's very clever in Jack and you, my lads," said Hiram. "Cap'n," he continued, "I reckon I had better rig up the mast agin and make a new sail. It'll help us powerful in gittin' back to the island. What do ye say?"

"Do so by all means, Hiram," said the captain.

"What do you call the new island, captain?" inquired Charley.

"We have named it Hiram Island," was the reply.

"Why, Hiram," said Harold, turning to the grinning sailor, "you're becoming well known in these parts of the world."

"Yes," said Hiram, "I cal'clate I am becoming wery celebrated. What with Hiram Harbor on Harding Island, and Hiram Island I hev been done proud, indeed."

All joined in helping Hiram rig up the new sail so as to leave Hiram Island as soon as possible. They were not only anxious about Jack being alone all this time, but wished to get off so as to avail themselves of the magnificent weather. There was time, however, before leaving for the boys to make a brief examination of the island. This did not take long, the island was so small. But small as it was, it possessed nearly all the characteristics of a regular coral island. It's outlines were those of an irregular flattened circle. It had the regular coral sand beach and shore platform facing the ocean, but the lagoon was absent. There had originally been a lagoon, but long ago it had either dried up or had been filled with sand washed or blown into it from the ocean. Here and there were a few sand hills formed by the wind, but in no place was the land much more than ten feet above the level of the ocean. The coral beach facing the old lagoon was still to be seen.

The life of the island was limited to a few screw-pines growing in the sand and some climbing plants. There were no cocoanut palms. Some birds had laid their eggs in the sand on the higher portions, but the high water of the preceding day, that had so nearly been disastrous to the captain and Hiram, had driven them away, and they left the island, flying toward the southeast. Most probably, as the captain remarked, toward Harding Island.

As soon as the mast and sail had been rigged up, they transferred the supply of food and fresh water

from boat No. 13, and all getting in, set out for Harding Island with boat No. 13 towed after them.

They met with nothing of especial interest on their return. Not only had Charley kept in mind the direction of Harding Island, but both the captain and Hiram had done the same thing. In due time they not only sighted the island, but at last brought both boats to Landing No. 2 at Jackson House.

Although Jack was, of course, unable to receive them, Rompey was present to do the honors for Jackson House. The poor dog was nearly crazy with delight at seeing them again, and ran rapidly from one to another, licking their hands and faces and endeavoring by wonderful tail shakings to tell them how glad he was to welcome them back.

"Harold," said the captain, "you and Charley had better run to the house and let Jack hear the good news. He can hear the way Rompey is going on, and will be anxious to know whether we are all safe."

As the two boys ran rapidly to Jackson House, Charley said:

"We'll call out to Jack that the captain and Hiram are both with us, or else when he sees only us he will think we have returned alone, and have therefore been unfortunate in our search."

Running up the stairs of Jackson House they burst into Jack's room, crying out:

"Hurrah, Jack! We've brought them both back in good health. They will be here now in a few minutes, as soon as they secure the boats."

"Thank God," said Jack. "I knew you had returned from the way Rompey went on; but when I heard the footsteps of only two of you I feared you were bringing bad news."

In a few moments the captain and Hiram burst into the room. Jack threw himself into the arms of the captain, while Hiram, awaiting his turn, was also soon heartily embracing the lad.

"Now, Uncle Arthur," exclaimed Harold, as soon as the embraces were over and a hurried explanation as to what had happened to each of them during their separation, "won't you please look at Jack's ankle? We are anxious to know whether it has been properly treated."

"Tell me just what has been done for it, Jack. The boys have already told me how the accident occurred."

When they were through, the captain said:

"It sounds all right, Jack, as far as the treatment goes, but let me see whether you have succeeded in getting the ankle straight, with all the bones and ligaments in their proper places."

The three boys, as well as Hiram, anxiously scanned the captain's face when he made a careful examination.

"It's all right," he exclaimed. "I don't think you'll have any trouble from it. Indeed, it looks in such good condition that I think, before long, you'll be able to begin walking on it again."

"Hurrah!" cried the boys. "That's the best news we have had since we saw you and Hiram on Hiram Island."

Charley, who had been hanging affectionately around the captain, said:

"I say, captain, you and Hiram can hardly believe how greatly we missed you. It seemed so odd to have no one to whom to go for advice when we were in trouble, especially to have no one to whom to tell our little successes and discoveries. It seemed just as if the bottom had dropped out of everything when we brought the boat back to Harding Island on the day of the storm. And then when Harold was taken sick with the fever we hardly knew what to do. We took from the library the medical book that tells about sickness and methods of treatment. It was plain sailing when we read up about ankles, because ankles are ankles; there's no getting mixed up with them. But when we came to read up about fevers, we found that fevers were the worst conundrums we had yet struck. Indeed, even the book itself did not appear to be able to tell one kind of fever from another until the fever was well developed, so we were at our wits' ends and, not knowing what to do, concluded it would be safer to do nothing, so we gave Harold the simple remedies you gave us the few times we were not feeling well."

"And you were very wise in doing so," said the captain.

"I imagine you are right, captain," said Charley, "but suppose we had made a mistake. But it don't make any difference now," he said, hugging the captain, "we've got you back again; so if one of us gets sick now we may be sure of the proper treatment."

"What kind of fever did you conclude Harold had?" inquired the captain. "I suppose you must have formed some idea or other."

"I should think they did," exclaimed Harold. "I was only sick a few days, and when I got well I was so hungry that I could eat almost anything. I believe I could have eaten some of that horrible sea-slug you cured and smoked, and which none of us have been able to eat, but Jack said I might have had typhoid fever, so he kept feeding me on what he called 'soft food.'"

"Well," said the captain, "I don't think that Jack was so wrong; although, as I understand it, typhoid fever is a disease that takes full six weeks to run."

"I thought, sir," said Jack apologetically, "that probably Harold might have had what is known as walking typhoid fever."

"Never mind, Jack," said the captain, "you acted cautiously, and therefore properly. Hiram," he said in a laughing tone, turning to the boatswain, "I guess we can trust the boys to take care of themselves, don't you think so?"

"I reckon they're all right for sartin," replied Hiram grinning. "They're wery intelligent lads. I'll allus back 'em to take proper care of themselves." And then turning to the lads, he said: "I say, boys, how did ye make out for cooking? Did ye have any trouble in preparing stuff for the table? All the cooking must hev fallen on Charley when both the others were a-bed."

This remark, of course, led to the narration of Charley's first wonderful rice pudding, and the awful

swelling of the rice. After they had all enjoyed a hearty laugh, Charley, turning to the captain, said:

"Captain, I know you and Hiram are ready for a first-class meal. Hiram, come with me to the kitchen, and I'll help you to prepare a regular feast in honor of the day. I want to show you the advance I have made in cooking since that first rice pudding."

As they were leaving, the captain said:

"It won't be much more trouble, so while you are cooking I'll bring an extra table to the room. We can then have the meal here in Jack's room. It will be less lonely for him than if we eat it downstairs."

That meal may not have been at all wonderful from a culinary point of view, although the food was both excellent and well prepared. But I very much doubt whether a meal has ever been eaten with a greater appetite and more pleasure than that memorable feast in the room that Jack had been occupying. Every one at the table had a splendid appetite, and then too, all their troubles, doubts, and perplexities had disappeared, so that they ate with an appetite as great, if not greater, than any meal they had ever eaten on Harding Island. And this is saying a great deal.

There was so much talk, after eating, that they sat a long time not only in asking and answering the questions as to what had occurred to the two boats during the storm as well as afterward. Indeed, it was nearly midnight when the captain said to the boys:

"We had better have our regular Bible reading, boys, and then turn in. It is now quite late and there

is much to do to-morrow. Of course, you have been unable for more than a week now to look after Maddox Clearing, and this we must do the first thing in the morning."

The captain's selection was the Twenty-third Psalm, "The Lord is my shepherd, I shall not want." It was an especially appropriate selection considering the many tribulations through which they had passed and their present happy condition. When he came to the fourth verse, and read: "Yea, though I walk through the valley of the shadow of death, I will fear no evil, for thou art with me," they felt that the Lord, indeed, had been with them to deliver them from all their troubles, and when the fifth verse was read, "Thou preparest a table before me in the presence of mine enemies," they looked significantly at the remains of the good things that had been so abundantly placed on the table.

After a brief prayer, in which the captain returned heartfelt thanks to the Shepherd for the manner in which he had carried them through their troubles, they turned in for the night.

Before going to sleep, Charley said to Harold:

"Harold, I don't ever remember having had so splendid a day since I was taken out of the open boat when I was so near joining my former companions in death, and I have had many splendid days both while on the derelict brig and on Harding Island.

"It's the same with me, Charley," said Harold, "I never remember such a splendid day."

CHAPTER XXIX

The War Canoe

The next few days were spent at Maddox Clearing harvesting their crops, some of which were stored in the attic at that place, but by far the greater amount was taken to Jackson House, and kept either in the attic or in some of the unused rooms. When this work was done, and an examination made of the entire island, there was plenty of spare time during which, it is unnecessary to say, the younger boys and, indeed for the matter of that, all of them had many splendid baths in the swimming-pool. Indeed, the spare time at the end of the harvest was spent largely by the boys in excursions in boat No. 13 on the principal lagoon, as well as in The Chums on the lagoon of Twin Island No. 1. During many of these excursions the captain and Jack, and sometimes Hiram, were present, but the greater part of the time Jack spent with the captain preparing the manuscript of the great book on the "Physical Geography of the Sea," while Hiram was busy in one or another of the many things that claimed his attention. And such times Harold and Charley spent together boating, fishing, swimming, and walking.

As soon as they could find the time they removed the coral-encrusted skeleton of the man from the fore-

castle of the brigantine and buried it alongside of Maddox near the Maddox Clearing, the captain reading the Episcopal burial service. Afterward they erected a cross on the grave, simply cutting thereon the fact that it marked the grave of the remains of a man taken from the wreck of the vessel of which Maddox had been captain.

Among other things the two lads especially liked to do, while away on these excursions, was to visit the coral-encrusted brigantine that, as before mentioned, was now high and dry on the beach at Parker Cliffs facing the ocean. They had cleaned the encrusted coral from the top of the table in the cabin, as well as from the floor, had covered the table with one of the many-colored blankets, and had spread another blanket on a part of the floor. Since the sunlight could shine full and clear in the room, it formed a pleasant retreat during the hotter hours of the day, so that they liked to retire to it to talk, tell stories, or to make entries in a little journal they had commenced, possibly in imitation of what Jack and the captain had been doing. This journal or diary was entitled, "Our Adventures on Harding Island." It was a remarkable production, containing much more imagination than would probably have been expected by those who have never taken the trouble to study the characteristics of boys about the age of Harold and Charley. The English may not have been elegant, but interesting facts were there and were well put. And since this work kept the boys busy, and tended to improve their English, it formed

a very pleasant and profitable way of spending a few of the warm hours of the day. They called this place "Brigantine House," and always kept a supply of pencils and paper for the work. Charley, who, as has already been stated, had a remarkable gift for drawing, had illustrated the journal with numerous ludicrous sketches depicting their adventures or experiences. They were now busily engaged in describing the many things that had happened to them not only during the storm, but during their great and adventurous voyage to the northeast, when they had rescued the captain and Hiram.

I fancy I hear some one, on reading about this resort of the boys, say:

"What in the world can healthy boys find in such an uncomfortable place as the cabin of a wrecked brigantine, when there were so many better places in the open air, or in either of the houses at Maddox Clearing or at Jackson Landing?"

But I am sure no healthy boy will be among these critics. Such boys know full well the fun that can be obtained from the ability of being in curious and out-of-the-way places. As all boys know, there is a great pleasure connected with such surroundings. Our boys, therefore, keenly enjoyed remaining in a place in which so many curious things had probably happened; for, being imaginative, as indeed nearly all healthy, growing boys are, they took pleasure in picturing to themselves the many strange things that might have taken place in that cabin more than a hundred years

before, when it had been occupied by Captain Maddox and other officers of the pearl-hunting brigantine.

Besides, if any of my readers suppose that the cabin was a dirty, damp, disagreeable place, they are very much mistaken. The bright sunlight, as well as the dry air that now could freely enter it, had long ago driven out all traces of mustiness. So far from the interior being dark and gloomy, a flood of sunlight entered through the open doorway and port holes, and being flung back from the white surfaces of the encrusting coral, illumined the interior of the cabin so as to make it resemble a fairy palace such as might have been the abode of the mermaids at the bottom of some great ocean.

It was in this manner that the three boys and the two men passed the four weeks on the island after the return of the captain and Hiram. They were indeed four happy weeks—happier by far than any they had previously known on the island. They had now again fallen into their usual employments, so that the days passed rapidly, without any dragging of time. Among other things, Hiram had made them all new suits of underwear from the highly colored cotton prints. While Jack was acting as amanuensis for the captain, the latter was giving Jack a course of instruction in navigation in which he was making considerable progress.

Charley and Harold had discovered an ocean-grotto near the boat-landing on the northern shore of Harding Channel at the end nearest the lagoon. They

had explored it for a short distance into the cliffs. It was by no means so extensive as the great grotto, the sudden destruction of which during the earthquake shock had resulted in the formation of Harding Channel. It extended, however, sufficiently into the cliffs to serve as an admirable hiding-place for the boat, so that no one passing through Harding Channel would be able to see it.

But now a great calamity was about to overtake them. A calamity far more serious than any they had previously experienced.

About one month after the return of the captain and Hiram to the island, Harold and Charley had left Jackson House early in the morning in order to finish some work at Maddox Clearing before the heat of the day, for the balance of the day was theirs, and they wanted to make the most of it. The evening before they left, Hiram had brought each of them a new suit of underclothes he had prepared from the highly colored cotton prints. They had put these on, giving Hiram their other clothes, which he had promised to wash and bleach. With a view of transferring some of the colored designs to their journal, in the manner of the decalcomania pictures that are known to most boys, Charley had placed a lot of cuttings of the prints in one of his pockets.

As soon as the boys had finished their work at the clearing they visited the swimming-pool. On removing their clothes they found, as on previous occasions,

that their bodies had been covered with the colored designs on the printed calico. This time, however, the transferrence had been wonderfully well done. The conditions of moisture and warmth were just such as to ensure the transferrence of the patterns in such a manner as to prevent running. The bodies of both lads were therefore covered with a wonderful combination of highly colored moons, suns, stars, comets, and other hieroglyphics. One might, indeed, easily imagine they were not ordinary boys, but powerful magicians or necromancers.

They tried to rub the marks off, but the water only fixed them more firmly to the skin. This didn't worry them, so after their swim they put on their clothes and, leaving the boat at the hiding-place in the grotto, walked along the northern shore of the channel toward the ocean, were soon in the cabin of the brigantine, where they had a jolly time entering notes in their journal, in chatting, telling stories, and singing.

As has already been remarked, both boys had well-trained voices. Charley had a pure soprano and Harold an alto, and since both had sung in church choirs at their homes, and had been well trained, their voices blended admirably, so that their songs were pleasant to listen to. Indeed, it had become a custom at Jackson House before retiring to have the lads sing, especially such songs as Jack and the captain and Hiram could join in; the captain with a bass voice and Jack with a baritone.

The boys had just finished singing when Charley,

who had been looking out of a port hole which gave him a view of the ocean to the northeast, cried out in alarm to Harold:

"Good gracious, Harold, I see a canoe filled with dark-skinned men coming rapidly this way."

Looking in the direction indicated, Harold saw a long canoe containing a dozen dark-colored men, half of whom were paddling. As Charley had said, the canoe was rapidly approaching the brigantine. The men had evidently seen it from a distance, and were coming to make a closer examination in the hope of finding something of value.

"What kind of canoe is that?" exclaimed Harold.

"Why, don't you remember what Mr. Maddox said in the letter we found in the box in his hand?"

"Oh, yes," answered Harold, "I remember now. That's a war canoe. I remember he spoke about a war canoe. What shall we do, Charley?" exclaimed Harold.

"Let's steal off the brigantine on the side away from them and make our way to the grotto, where we will hide and wait till they leave. I guess I'll take these pads of writing paper with me and this pencil," said Charley, going into his pockets, "they may come handy." It may be mentioned that Charley generally had a number of small writing-pads in his pockets, together with pencils. He used them for rough sketches, and had, of course, obtained them on the brig.

There was no trouble in the boys' leaving the brigantine on the side away from the approaching canoe

without being seen, but it was quite another thing to pass unobserved over the flat land of the beach. It is true they tried to do this by crouching near the ground, but before they had gone far they were detected by the men in the canoe that was now rapidly approaching the beach. Not waiting for the boat to land, several of the almost naked savages jumped into the water and, reaching the land, ran rapidly toward the boys, seizing them, and binding their hands together back of them with a coarse rope made of cocoanut fiber. They said something to the boys, but it was in a language the boys could not understand. The boys on their part were also unsuccessful in making them understand what they said.

After some difficulty the canoe safely landed in the new channel near the ocean. One of the men, who was evidently a chief, commenced to make signs. Charley, who at once concluded that it was the best policy not to resist the men—for, of course, two boys could do nothing against twelve men—pretended to regard the whole matter as a joke, and looked laughingly at them.

The chief and, indeed, most of the men appeared to be much pleased with the apparent bravery of the two boys, for Charley had at once advised Harold to do exactly what he was doing.

"We can't get away from these men now," he said, "but we may fool them and persuade them afterward to untie our hands. We will then be able to get away and hide somewhere in the grotto. Let's try to understand what that man, who I think is the chief, is trying

to ask us." And then approaching the chief with a smiling face, and looking him straight in the face, he raised his eyebrows, as much as if to say to the man:

"What is it you want?"

The chief appeared instantly to understand the lad's query, and began making signs to indicate that they were looking for drinking water; for placing some ocean water in his hand he raised it to his lips pretending to drink, and then spitting indicated that the water was not fit to drink. He then walked a short distance along the coast and pretending to dip his hand into a pool of water raised it to his lips, smacked them as if satisfied with the taste and, looking at Charley, he raised his eyebrows as much as to say:

"Can you show me where I can find some?"

Charley, who was quick-witted, had no difficulty in understanding, so nodding his head, as much as to say, "I will show you," turned so as to bring his tied hands near the hands of the chief, thus indicating that he could show him better if his hands were untied. And when this was done he pointed to Harold's.

The chief appeared to be much tickled by this action of the young boy, and said something to his men, who laughed in a manner that seemed to show that both lads were beginning to make friends with their captors.

As soon as the hands of the boys had been freed, Charley and Harold, beckoning to the chief, proceeded to a part of the coast toward the north, where a strong spring of good, cool, fresh water was pouring out of an opening in the limestone cliff.

The chief tasted the water, and said something to the boys that they understood as being thanks for what they had shown them. Then calling to some of the men in the boat they brought water vessels, and filling them with enough water to last the crew for three or four days, took them back to the boat.

But the chief still wanted something more. Turning to the boat he made signs to Charley that they were hard up for food; for moving his mouth, as if eating, he would turn to the boat and try to show by the nodding of his head that there was nothing there, and then turning to Charley he would point to the island as much as to say:

"What can we find to eat here?"

Charley at once understood the chief, and beckoning him to follow, led the chief, accompanied by five men, to a grove of cocoanut trees about a mile from where they had landed. Standing at the foot of two of the largest trees the boys made signs to the chief as to whether they wished them to climb the trees and throw the cocoanuts to them. The men laughed as the chief nodded his head indicating yes, and the two boys shinning up the trees like monkeys soon threw down as many cocoanuts as all of the men could carry to the boat, and then came down. This good-natured willingness of the boys to do what had been asked of them again greatly pleased the chief; for, making no effort again to bind their hands, he beckoned them to follow him to the boat, which was soon laden with the cocoanuts.

It was evident that the men did not intend to make an extended examination of the island. As the boys learned afterward they had been on one of the predatory expeditions so common in these parts of the world. They had only approached the island, which was apparently new to them, for the purpose of looking for water and food to last until their return to their own island. On seeing the coral-encrusted wreck of the brigantine, they had landed on this part of the coast in order to see if it contained anything of value.

Before leaving, however, the chief again began to make signs to Charley, and pointing to the channel was evidently desirous of knowing how deep the water was and whether their canoe could safely pass through it into the lagoon. Fearing that should the canoe take the northern shore of the channel their boat might be seen, Charley pointed to the southern shore, and indicated by signs that the water was deep enough. He had difficulty, however, in making himself understood, so taking one of the paper pads from his pocket he rapidly made a sketch of the island, of the Harding Channel, and of the canoe, which he represented as floating in the water on the western coast, and then drawing an irregular line underneath this canoe, to indicate a rough bottom, he showed that the distance from the bottom of the canoe to the bottom of the channel was many times the height of the canoe.

The chief instantly understood the drawings, and then, again patting the boy on the back, he said something that appeared to meet the approval of the men,

for they all commenced murmuring. They examined the drawing as though they believed that Charley was a very unusual specimen of a boy, which indeed was true, for he was much brighter than the average civilized boy, and therefore must have been almost immeasurably brighter than any of their own lads. The chief was so much pleased with the sketch that he kept it.

Leaving Charley and Harold in the care of two men the chief entered the canoe with the remaining men and rapidly passed along the southern shore of Harding Channel and entered the lagoon. In the meanwhile, the two men with whom the boys had been left sauntered off slowly toward the brigantine, evidently with a view of examining it during the absence of the others.

CHAPTER XXX

In Captivity

It must not be forgotten that Rompey, who almost invariably accompanied the boys in their excursions, was with them when they were captured and their hands bound back of them. While this was being done Rompey had threatened to bite the men, growling ferociously and rushing at them. The men, however, appeared to regard this as a huge joke, for such a comparatively small animal to fly against men armed with huge spears. So they tried to kill the dog. Rompey, however, was too quick for them, and always escaped. Standing just a little distance beyond them, he continued barking. The chief now said something to one of the men, evidently telling him to kill the animal, for the man hurled his spear at the dog, who happily escaped it. Rompey ran away but did not desert the boys, for he remained in full sight of them.

When the men who had been left with Charley and Harold went to the brigantine, they pointed to the lads telling them to wait for them and, appearing to doubt that they would do this, bound them to a part of the old rudder. Fortunately, the binding was not very tight, so that Charley succeeded in loosing his right hand, and drawing a sheet of paper and lead pencil

from his pocket, hurriedly scribbled on it the following note.

"A war canoe has landed on the island near the brigantine. Harold and I saw them coming while in the cabin. They have taken us prisoners and bound our hands. I have endeavored to gain their good will by showing them where to get fresh water and cocoanuts. I think they intend taking us away in the canoe. Am sending this by Rompey."

As soon as the men disappeared, Rompey ran rapidly toward them and tried to tear the bindings loose with his teeth, but was unable to do so. Charley quickly tied the note under Rompey's collar, and then said to the dog:

"Go to the captain, Rompey. Go find the captain."

The animal appeared unwilling to leave the boys and again began to tear at the cocoanut rope that bound them but, hearing the men returning, Charley again bade him seek the captain. So jumping up at the boys and licking their faces affectionately, the dog set off at a rapid gait along the northern coast of the island, evidently bound for Jackson House.

The war canoe returned in about half an hour. The men had apparently seen nothing in the lagoon to attract their attention. They had not made a careful examination or else they would have seen the flagpoles at the landing-places.

The chief, who did not seem to be in a hurry, spent a considerable time in the careful examination of the brigantine. It was clear that the natives were ac-

quainted with wrecks, and had confidently expected to be able to take from this things of value. They failed, however, after an extended examination to find anything that struck their fancy with the exception of the highly colored blankets employed for covering the table and the floor of the room. The chief had already cut a hole in the middle of the blanket employed for covering the table and, thrusting his head through it, was marching around as proud as a turkey cock. The other blanket from the floor had been divided into four equal parts that were similarly, though less conspicuously, adorning four other men who appeared to be next in authority to the chief.

The savages then prepared a meal consisting of dried fish they had brought with them and the fruit of the cocoanut. It was several hours from the time that they had landed on the island before they motioned the two boys to accompany them to the canoe and, pushing off, were soon moving rapidly toward the northeast.

The lines on which the boat was built were excellent. The men were strong and vigorous and, since six of them paddled, the speed with which the boat moved was much greater than anything the captain and Hiram had been able to get out of any of the boats on Harding Island.

Though Charley said nothing, yet he carefully scanned the island as its distant shores were becoming more and more indistinct from the boats. At last, to his great joy, he could faintly see in the distance three people running rapidly along the southern coast of the

island. He recognized them as the captain, Hiram, and Jack.

"That's good anyhow," he whispered to Harold, "they'll at least know in which direction we have been carried."

But leaving the canoe moving rapidly toward the northeast, let us return to Jackson House. Jack and the captain had been spending an extremely pleasant day. Jack had completed his work as an amanuensis, and the captain was giving him another lesson in seamanship.

It was evident Jack had been making satisfactory progress, for the captain seemed greatly pleased with an answer he gave to a question put. At this moment both stopped talking and looked at each other with no little alarm; for both distinctly heard Rompey's light footsteps running toward the house unaccompanied by the boys.

"What can be the matter, Jack?" exclaimed the captain. "Rompey all alone! Where are the boys? I fear something has happened to them."

"I never knew Rompey to come home alone when he had started out with the boys," said Jack.

At this moment Rompey came running into the room. He was greatly excited and ran immediately to the captain and, looking him earnestly in the face, began whimpering as if trying to call his attention to something.

"What's the matter, Rompey?" inquired the captain, "where are Charley and Harold?"

At this the dog began barking louder than ever and, at the same time, rubbed his neck against the captain's hand as if trying to call his attention to the note Charley had attached to his collar.

"See, captain," said Jack, "Rompey has brought a note."

The captain had seen the note even before Jack had commenced to talk. Removing it from Rompey's collar, he hurriedly read Charley's hastily scribbled communication.

"It is as I feared, Jack," said the captain, "Charley and Harold have been taken prisoners by savages who have landed on the island in a canoe. Listen," and with that he read the note, the contents of which have already been given in the previous chapter.

"Can we do anything?" inquired Jack of the captain.

"We will try to rescue them. But run quickly and bring Hiram here to talk the matter over. I think I heard him outside the house a few moments ago."

When Hiram entered the room with Jack, as he did a few moments afterward, Jack, of course, had told him the terrible news. Hiram appeared even more alarmed than the captain; for he knew the danger of being taken captive by some of the savages of that part of the world, especially when they were on a war expedition.

"Where were the lads when they wuz took, captain?" inquired Hiram. "On what part of the island did the canoe land?"

"The boys were in the brigantine. They tried to escape, but were taken prisoners. Listen to the note Charley sent by Rompey."

As the captain read the note, Hiram's face showed growing fear.

"That's sounds wery bad, captain," he remarked; and then seeing that the captain thoroughly shared his fears, and being desirous of comforting both the captain and Jack, he added: "But don't give up. Ef we put our wits against the wits of them savages we ought to be able to beat them."

"That's right, Hiram," said the captain, who had in the meanwhile been thrusting a pair of revolvers in his belt and taking a rifle. "Let's get off. Jack, take pistols and a rifle with you. Hiram, do the same thing."

"Yes," said Hiram, "and I'll take this cutlass with me. I feel more at home with a cutlass than I do with them shooters."

"What will be our quickest way to the southeastern coast?" said the captain.

"Boat No. 23 is at the landing," said Jack. "We can row there much faster than we can run."

They hurried to the boat, but before starting took the precaution of placing additional food and water in it, and rowed it rapidly toward Harding Channel.

The distance between Jackson House and Harding Channel had probably never been covered by them in shorter time than was made by boat No. 23 on this memorable occasion. The boat fairly flew through the

"They . . . were just able to see a tiny speck moving rapidly from the island."
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water, and the water of the lagoon being at that time almost as smooth as a mirror, they made magnificent time, and were soon at the eastern side of the island. Running down the beach toward the southeast they looked across the waters toward the southwest and were just able to see a tiny speck moving rapidly from the island.

"I reckon that be them," said Hiram, pointing to the distant object.

The captain who, of course, had his glasses with him, focused them on the tiny speck, and looking for a few moments, said:

"Yes, Hiram, I can see the boys quite distinctly."

"Do they look skeert, captain?" anxiously inquired Hiram.

"Not a bit of it," remarked the captain. "As well as I can see from their faces, one would think they were merely going on a rowing excursion. What are those colored things some of the men are wearing? Oh, I see now," he added, "it's some of our blankets. I wonder whether they have been up to Maddox House."

"Captain," said Jack, "the boys had two blankets in the cabin of the coral-encrusted brigantine, one on the table as a cover, and the other on the floor. Don't you remember you gave them two for that purpose?"

"Yes," said the captain, "I remember now."

"Cap'n," said Hiram, "I'm wery glad to learn that the boys don't appear skeert, for them savages'll be more apt to treat them well if they stand up boldlike. How many men are there in the boat?"

"As far as I can see there are only twelve men."

"Then, if we can come up to them, we might manage to take the boys from them."

"Yes," said the captain, "if we should come up to them, but take the glasses and look for yourself. In the first place they are too far off for us to be able to reach them and, moreover, as you can see, they have six paddles and are carrying the canoe at a very much more rapid gait than anything we are able to do with boat No. 23."

"Nevertheless, captain," said Jack anxiously, "we will surely go after them, won't we?"

"Yes, Jack," was the reply; "we will certainly go after them. But let's watch them for a few moments longer to see if they change their direction."

As they watched they saw that the course of the canoe was not changed, but that it was still rapidly moving toward the northeast. At last it disappeared below the horizon.

"Come," said the captain, "let's pull the boat the other side of the channel and hurry to the top of the hill at Parker Cliffs where we can watch the distant canoe, and be sure that it does not change its direction."

It took some time for them to do this, but when they reached the top of the hill the captain was soon again able to see that the canoe had not yet changed its direction.

As the captain was scanning the distant boat, he suddenly exclaimed in an excited tone:

"Five other canoes have joined the one that is carry-

ing off our boys. They evidently belong to the same party, for they are not fighting but are still going toward the northeast. The canoe containing the boys is evidently not commanded by the chief of the party, for it is following, and not leading the other canoes."

"Do you think there is any danger of the savages killing the boys, captain?" inquired Jack eagerly.

"What do you think of that, Hiram?" said the captain, apparently unwilling to answer Jack directly.

"I s'pose, my lad," said Hiram, "you want to know the truth?"

"Yes, Hiram," said Jack, "tell me what you really think."

"Then," said Hiram, "I must say that I'm afeerd there is much danger. Ef course it all depends on who the men be. There be so many kinds of people in these here waters thet ef the men in the canoes come from some of the islands the boys would be ez safe ez they would be with us. But then agin there be others, and some of 'em are cannibals, thet might probably eat the youngsters."

"Oh, that would be horrible," said Jack, "let's hurry after them."

"All in good time," said the captain. "This is something we must do intelligently. The boat is not sufficiently loaded with food and water to go the great distance it will probably be required to do before reaching the island to which our boys are evidently being taken."

"Now, Master Jack," said Hiram, seeing how anx-

ious the boy was, " let me tell ye this. What the cap'n told us about Master Charley and Harold looking as though they weren't skeert like gives me great hopes that the youngsters will get through this trouble all right. Them boys be wery bright, especially Master Charley, and I shouldn't wonder that he had concluded to try to win the savages over to him, and as I and you know, cap'n," he continued, with a sad smile, " the lad is oncommonly strong in that line."

" Hiram's right, Jack," said the captain. " The boys appear to have taken the best way of ensuring their safety."

They stood for a few moments at the top of the hill until the group of distant canoes disappeared below the northeastern horizon.

" Let us return to Jackson House," continued the captain, " and load the boat with everything that is necessary. We will then start on our long voyage. We will leave nothing undone to rescue our dear boys from the savages and bring them back to Harding Island."

What happened to the boys and their three friends will be recited in the third book of this series, entitled, " In Captivity in the Pacific."

THE END

APPENDIX

The Cocoanut Palm

The following facts concerning the cocoanut or, as the Polynesians call it, the *haari,* and the botanists the *coccos nucifera,* will be of interest to the general reader. The following extract from Vol. I, "Polynesian Researches," by William Ellis, has therefore been appended:

"The tree on which the cocoanut grows is also one of the most useful and ornamental in the islands, imparting to the landscape, in which it fails not to form a conspicuous object, all the richness and elegance of intertropical verdure.

"The stem is perfectly cylindrical, three or four feet in diameter at the root, very gradually tapering to the top, where it is probably not more than eighteen inches round. It is one single stem from the root to the crown, composed apparently of a vast number of small hollow reeds, united by a kind of resinous pith, and enclosed in a rough, brittle, and exceedingly hard kind of bark. The stem is without branch or leaf, excepting at the top, where a beautiful crown or tuft of long green leaves appears like a graceful plume waving in the fitful breeze, or nodding over the spreading wood or the humble shrubbery. The nut begins to grow in a few months after it is planted; in about five or six

years the stem is seven or eight feet high, and the tree begins to bear. It continues to grow and bear fifty or sixty years, or perhaps longer, as there are many groves of trees, apparently in their highest perfection, which were planted by Pomare (a chief of one of the largest of the South Sea Islands) nearly forty years ago. While the plants are young they require fencing in order to protect them from the pigs; but after the crown has reached a few feet above the ground the plants require no further care.

"The bread-fruit, the plantain, and almost every other tree furnishing any valuable fruit, arrives at perfection only in the most fertile soil; but the cocoanut, although it will grow in the rich bottoms of the valleys, and by the side of the streams that flow through them, yet flourishes equally on the barren sea-beach, amid fragments of coral and sand, where its roots are washed by every rising tide; and on the sunburnt sides of the mountains, where the soil is shallow and remote from the streams so favorable to vegetation. The trunk of the tree is used for a variety of purposes: their best spears were made with cocoanut wood; wall plates, rafters, and pillars for their larger houses were often of the same material; their instruments for splitting bread-fruit; their rollers for their canoes, and also their most durable fences were made with its trunk. It is also a valuable kind of fuel, and makes excellent charcoal.

"The timber is not the only valuable article the cocoanut tree furnishes. The leaves, called *niau,* are

composed of strong stalks twelve or fifteen feet long. A number of long narrow-pointed leaflets are ranged alternately on opposite sides. The leaflets are often plaited, when the whole leaf is called *paua,* and forms an excellent screen for the sides of their houses, or covering for their floors. Several kinds of baskets are also made with the leaves, one of which, called *arairi,* is neat, convenient, and durable. They were also plaited for bonnets or shades for the forehead and eyes, and were worn by both sexes. In many of their religious ceremonies they were used, and the niau, or leaf, was also an emblem of authority, and was sent by the chief to his dependents when any requisition was made; bunches or strings of the leaflets were also suspended in the temple on certain occasions, and answered the same purpose as beads in Roman Catholic worship, reminding the priest or the worshiper of the order of his prayers. On the tough and stiff stalks of the leaflets, the candle nuts, employed for lighting their houses, were strung when used.

"Round that part of the stem of the leaf which is attached to the trunk of the tree, there is a singular provision of nature for the security of the long leaves against the violence of the winds. A remarkably fine, strong, fibrous matting, attached to the bark under the bottom of the stalk, extending half-way around the trunk, and reaching perhaps two or three feet up the leaf, acting like a bracing of network to each side of the stalk, keeps it steadily fixed to the trunk. While the leaves are young this substance is remarkably

white, transparent, and as fine in texture as silver paper. In this state it is occasionally cut into long narrow slips, tied up in bunches, and used by the natives to ornament their hair. Its remarkable flexibility, beautiful whiteness, and glossy surface render it a singularly novel, light, and elegant plume; the effect of which is heightened by its contrast with the black and shining ringlets of the native hair it surmounts. As the leaf increases in size, and the matting is exposed to the air, it becomes coarser and stronger, assuming a yellowish color, and is called *Aa*.

"There is a kind of seam along the center, exactly under the stem of the leaf, from both sides of which long and tough fibers, about the size of a bristle, regularly diverge in an oblique direction. Sometimes there appear to be two layers of fibers which cross each other, and the whole is cemented with a still finer, fibrous, and adhesive substance. The lengths and evenness of the threads or fibers, the regular manner in which they cross each other at oblique angles; the extent of surface, and the thickness of the piece corresponding with that of coarse cotton cloth; the singular manner in which the fibers are attached to each other cause this curious substance, woven in the loom of nature, to present to the eye a remarkable resemblance to cloth spun and woven by human ingenuity.

"This singular fibrous matting is sometimes taken off by the natives in pieces two or three feet wide, and used as wrapping for their arrowroot, or made up into bags. It is also occasionally employed in preparing

articles of clothing. Jackets, coats, and even shirts are made with Aa, though the coarsest linen cloth would be much more soft and flexible. To these shirts the natives generally fix a cotton collar and wristbands, and seem susceptible of but little irritation from its wiry texture and surface. It is a favorite dress with the fishermen and others occupied on the sea.

"The fruit, however, is the most valuable part of this serviceable, hardy, and beautiful plant. The flowers are small and white, insignificant when compared with the size of the tree or the fruit. They are ranged along the sides of a tough, succulent, branching stalk, surrounded by a sheath, which the natives call *aroe,* and are fixed to the trunk of the tree, immediately above the bottom of the leaf. Fruit in every stage, from the first formation after the falling of the blossom, to the hard, dry, ripe, and full-grown nut, that has almost begun to germinate, may be seen at one time on the same tree, and frequently fruit in several distinct stages on the same bunch, attached to the trunk of the same stalk.

"The tree is slow in growth, and the fruit does not, probably, come to perfection in much less than twelve months after the blossoms have fallen. A bunch will sometimes contain twenty or thirty nuts, and there are, perhaps, six or seven bunches on the tree at a time. Each nut is surrounded by a tough, fibrous husk, in some parts two inches thick; and when it has reached its full size it contains, enclosed in a soft white shell, a pint or a pint and a half of juice or cocoanut milk.

"There is at this time no pulp whatever in the inside. In this stage of its growth the nut is called *oua,* and the liquid is preferred to that found in the nut in any other state. It is perfectly clear, and in taste combines a degree of acidity and sweetness, which renders it equal to the best lemonade. No accurate idea of the consistency and taste of the juice of the cocoanut can be formed from that found in the nuts brought to England. These are old and dry, and the fluid comparatively rancid; in this state they are never used by the natives except for the purpose of planting or extracting oil. The shell of the oua, or young cocoanut, is often used medicinally.

"In a few weeks after the nut has reached its full size, a soft white pulp, remarkably delicate and sweet, resembling, in consistency and appearance, the white of a slightly boiled egg, is formed around the inside of the shell. In this state it is called *niaa,* and is eaten by the chiefs as an article of luxury, and used in preparing many of what may be called the made-dishes of Tahitian banquets. After remaining a month or six weeks longer, the pulp on the inside becomes much firmer, and rather more than half an inch in thickness. The juice assumes a whitish color and a sharper taste. It is now called *omoto,* and is not so much used. If allowed to hang two or three months longer on the tree the outside skin becomes yellow and brown, the shell hardens, the kernel increases to an inch or an inch and a quarter in thickness, and the liquid is reduced to less than half a pint. It is now called *opaa,* and,

after hanging some months on the tree, falls to the ground. The hard nut is sometimes broken in two and broiled. . .

"If the cocoanut is kept long after it is fully ripe a white, sweet, spongy substance is formed in the inside, originating at the inner end of the germ which is enclosed in the kernel, immediately opposite one of the three apertures or eyes, in the sharpest end of the shell. This fibrous sponge ultimately absorbs the water and fills the concavity, dissolving the hard kernel, and combining it with its own substance, so that the shell, instead of containing a kernel and milk, encloses only a soft cellular substance. While this truly wonderful process is going on within the nut, a single bud or shoot, of a white color but hard texture, forces its way through one of the holes in the shell, perforates the tough, fibrous husk and, after rising some inches, begins to unfold its pale green leaves to the light and the air; at this time, also, two thick white fibers, originating in the same point, push away the stoppers or covering from the other two holes in the shell, pierce the husk in an opposite direction, and finally penetrate the ground. If allowed to remain, the shell, which no knife would cut, and which a saw would scarcely penetrate, is burst by an expansive power, generated within itself; the husk and the shell gradually decay and, forming a light manure, facilitate the growth of the young plant, which gradually strikes its roots deeper, elevates its stalk, and expands its leaves until it becomes a lofty, fruitful, and graceful tree.

"There are many varieties of the cocoanut tree, in some of which the fruit is rather small and sweet. For each variety the natives have a distinct name, as well as for the same nut in its different stages of perfection. I have the names of six sorts, but it is unnecessary to insert them.

"The juice of the nuts growing on the seashore does not appear to partake, in any degree, of the saline property of the water that must constantly moisten the roots of the tree. The milk of the nuts from the sandy beach or the rocky mountain is often as sweet and as rich as that grown in the most fertile parts of the valley.

"On first arriving in the islands, we used the cocoanut milk freely, but, subsequently, preferred plain water as a beverage; not that the milk became less agreeable, but because we supposed the free use of it predisposed to certain dropsical complaints prevalent among the people. Cocoanuts were formerly a considerable article of food among the common people, and were used with profusion on every feast of the chiefs; but, for some years past, they have been preserved and allowed to ripen on the tree, for the purpose of preparing oil, which has recently become an article of exportation, although the value is so small as to afford them but little encouragement to its extended manufacture.

"The cocoanut trees are remarkably high, sometimes sixty or seventy feet, with only a tuft of leaves, and a number of bunches of fruit on the top; yet the

natives gather the fruit with comparative ease. A little boy strips off a piece of bark from a *purau,* branch, and fastens it round his feet, leaving a space of four or five inches between them, and then, clasping the tree, he vaults up its trunk with greater agility and ease than a European could ascend a ladder to an equal elevation. When they gather a bunch at a time they lower them down by a rope; but when they pluck the fruit singly, they cast them on the ground. In throwing down the nuts they give them a whirling motion that they may fall on the point and not on the side, whereby they would be likely to burst.

"The cocoanut oil is procured from the pulp, and is prepared by grating the kernel of the old nut and depositing it in a long wooden trough, usually the trunk of a tree hollowed out. This is placed in the sun every morning, and exposed during the day; after a few days the grated nut is piled up in heaps in the trough, leaving a small space between each heap. As the oil exudes it drains into the hollows, whence it is scooped in bamboo canes and preserved for sale or use. After the oil ceases to collect in the trough, the kernel is put into a bag, of the matted fibers, and submitted to the action of a rude lever press; but the additional quantity of oil thus obtained is inferior in quality to that produced by the heat of the sun.

"In addition to these advantages, the shells of the large old cocoanuts are used as water-bottles, the largest of which will hold a quart; they are of a black color, frequently highly polished, and with care last a

number of years. All the cups and drinking vessels of the natives are made with cocoanut shells, usually of the *omoto,* which is of a yellow color. It is scraped very thin, and is often slightly transparent. Their *ava* cups were generally black, highly polished, and sometimes ingeniously carved with a variety of devices, but the Tahitians did not excel in carving. The fibers of the husk are separated from the pulp by soaking them in water, and are used in making various kinds of *cinet* and cordage, especially a valuable *coiar* rope.

" It is impossible to contemplate either the breadfruit or cocoanut tree, in their gigantic and spontaneous growth, their majestic appearance, the value and abundance of their fruit, and the varied purposes to which they are subservient without admiring the wisdom and benevolence of the Creator, and his distinguishing kindness toward the inhabitants of these interesting islands."

The following quotation from Hartwig's " Tropical World " will give some additional information concerning the cocoanut palm:

" No other tree in the world, no other plant cultivated by man contributes in so many ways to his wants and comforts as the cocoanut palm. Besides furnishing their chief food to many tribes on the coast within the torrid zone, the nut contains a valuable oil which burns without smoke or smell, and serves, when fresh, for culinary purposes.

" The fibrous rind or husk of the nut furnishes the

coiar of commerce, a scarce less important article of trade than the oil itself. It is prepared by soaking for some months in water, for the purpose of decomposing the interstitial pith, after which it is beaten to pieces until the fibers have completely separated, and ultimately dried in the sun. Ropes made of coiar, a name given to cocoanut fiber or the buoyant cables made therefrom, though not so neat in appearance as hempen cords, are superior in lightness, and exceed them in durability, particularly if wetted frequently by salt water. From their elasticity and strength they are exceedingly valuable for cables. Besides cordage of every caliber, beds, cushions, carpets, brushes, and nets are manufactured from the filaments of the cocoanut husk, while the hard shell is fashioned into drinking-cups, spoons, beads, bottles, and knife-handles. From the spathes of the unopened flowers a delicious 'toddy' is drawn which, drunk at sunrise, before fermentation has taken place, acts as a cooling, gentle aperient, but in a few hours changes into an intoxicating wine, and may be distilled into *arrack*. The strong, tough foot-stalks of the fronds, which attain a length of from eighteen to twenty feet, are used for fences, for yokes for carrying burdens on the shoulders, for fishing-rods; the leaflets serve for roofing, for mats, for baskets, for cattle-fodder; and their mid-ribs form good brooms for the decks of ships. Cooked or stewed, the cabbage or cluster of unexpanded leaves is an excellent vegetable, though rarely used, as it necessarily involves the destruction of the tree; and even the tough web or net-

work, which sustains the foot-stalks of the leaves, may be stripped off in large pieces and used for straining. After the cocoanut tree has ceased to bear, its wood serves for many valuable purposes—for the building of ships, bungalows, and huts; for furniture and farming implements of every description; and, as it admits of a fine polish, and its reddish ground color is beautifully veined with dark lines, it is frequently imported into England under the name of porcupine-wood."

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